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DONALD S. COOK

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THE EFFECT OF JUVENILE DIVERSION AND

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JUVENILE CRIME RATES

DEGREE FOR WHICH THESIS WAS PRESENTED MASTER OF ARTS
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THE UNIVERSITY OF ALBERTA

THE EFFECT OF JUVENILE DIVERSION AND POPULATION ON AN INTERPRETATION OF JUVENILE CRIME RATES



A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF MASTER OF ARTS

DEPARTMENT OF SOCIOLOGY

EDMONTON, ALBERTA SPRING, 1982



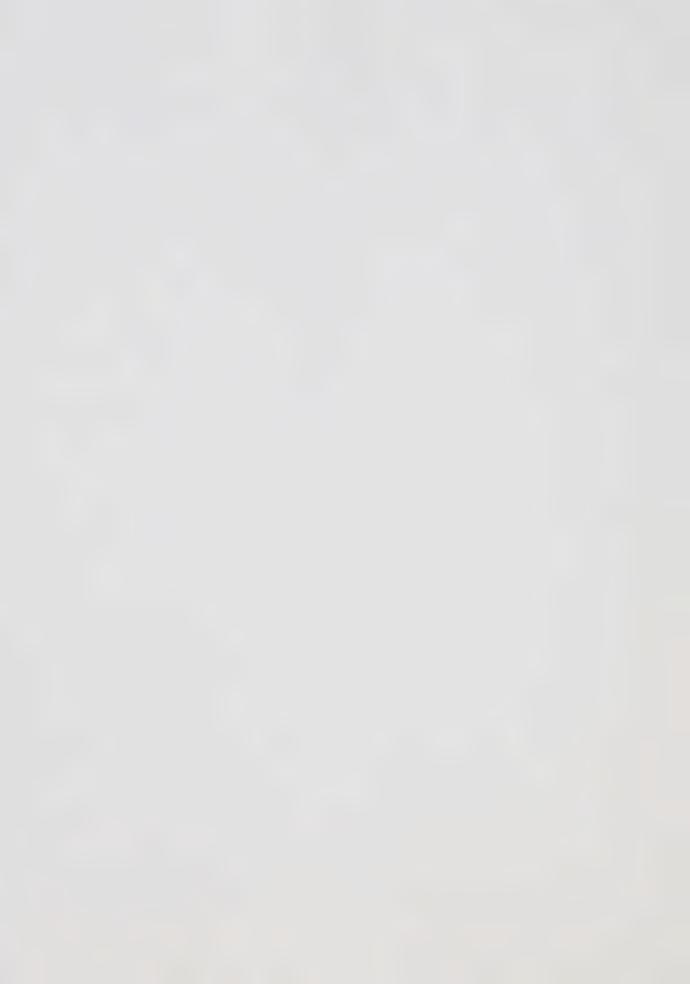
THE UNIVERSITY OF ALBERTA FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled THE EFFECT OF JUVENILE DIVERSION AND POPULATION ON AN INTERPRETATION OF JUVENILE CRIME RATES submitted by DONALD S. COOK in partial fulfilment of the requirements for the degree of MASTER OF ARTS.



Dedication

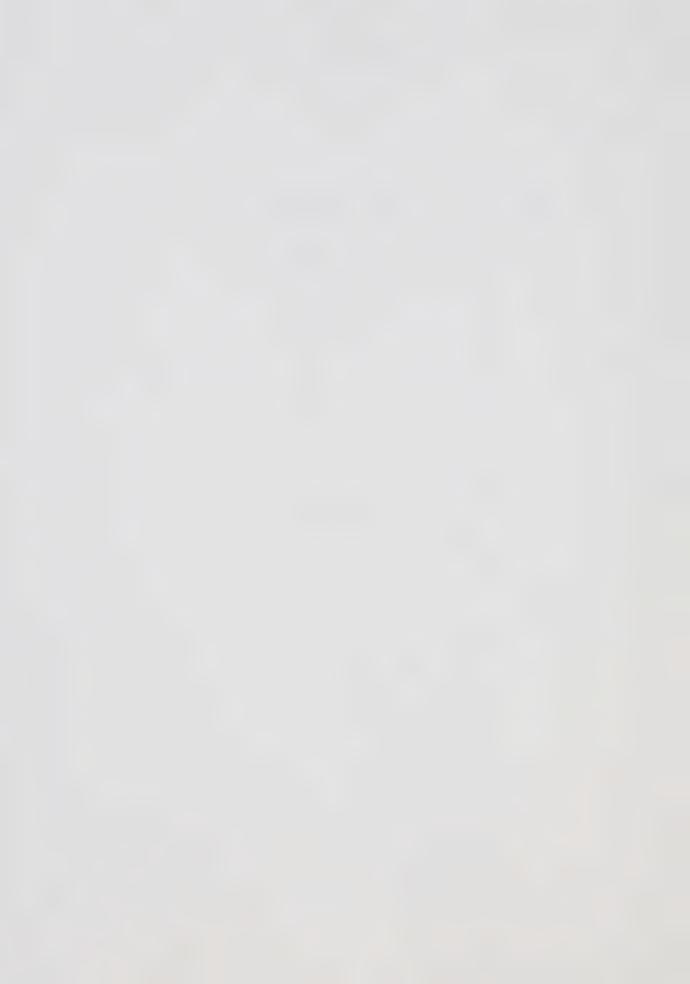
This thesis is dedicated to my grandmother, Margaret Landon, whose deep respect for academic achievement provided the inspiration for me to undertake the task.



the pattern remaining the same. The effect of combining diversion and population controls is a level of police contact with juveniles that is far greater than indicated by an unstandardized measure. Provincial rankings change order as the result of these controls, showing that the traditional measure is misleading if we are concerned with relative juvenile crime involvement with the police. It is suggested that more study is needed to probe the various provincial directives and practices relating to the police handling of juvenile offenders, before any concrete conclusions can be made concerning juvenile crime volume.

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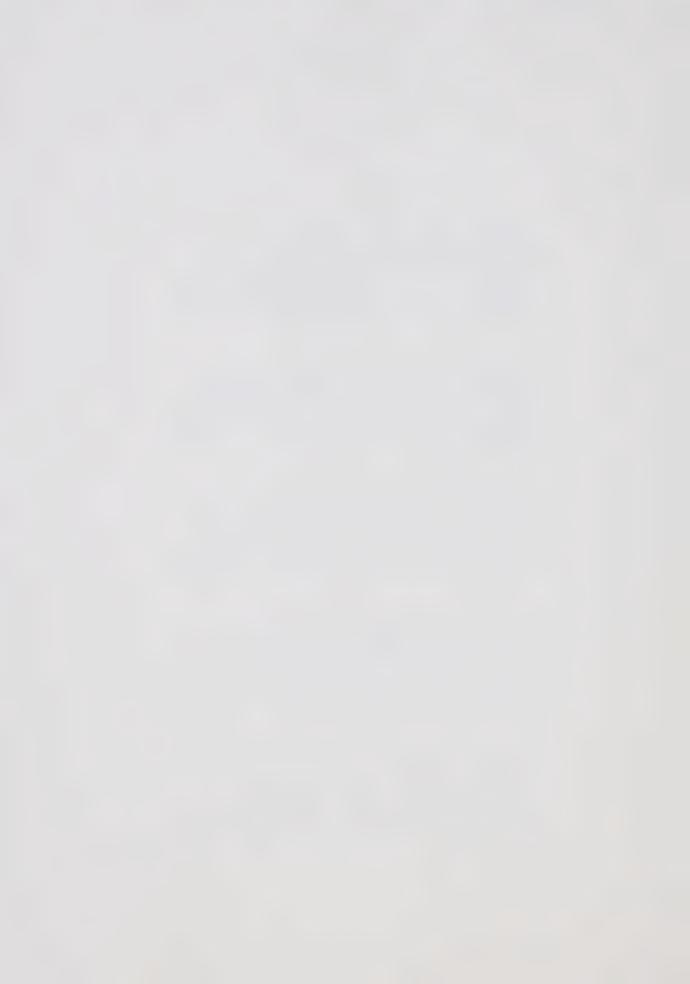
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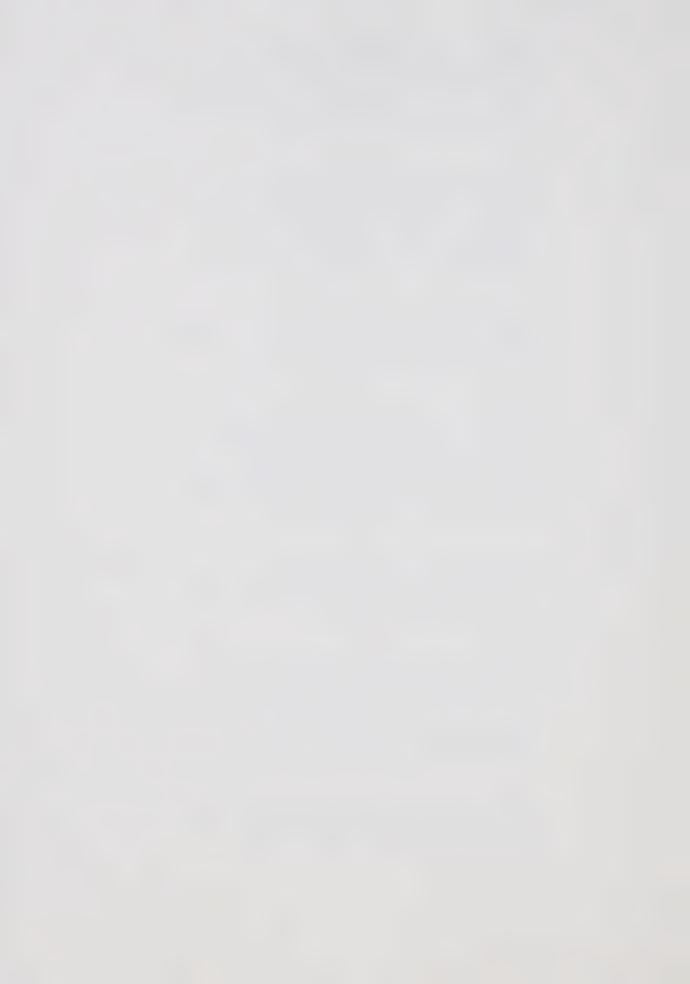
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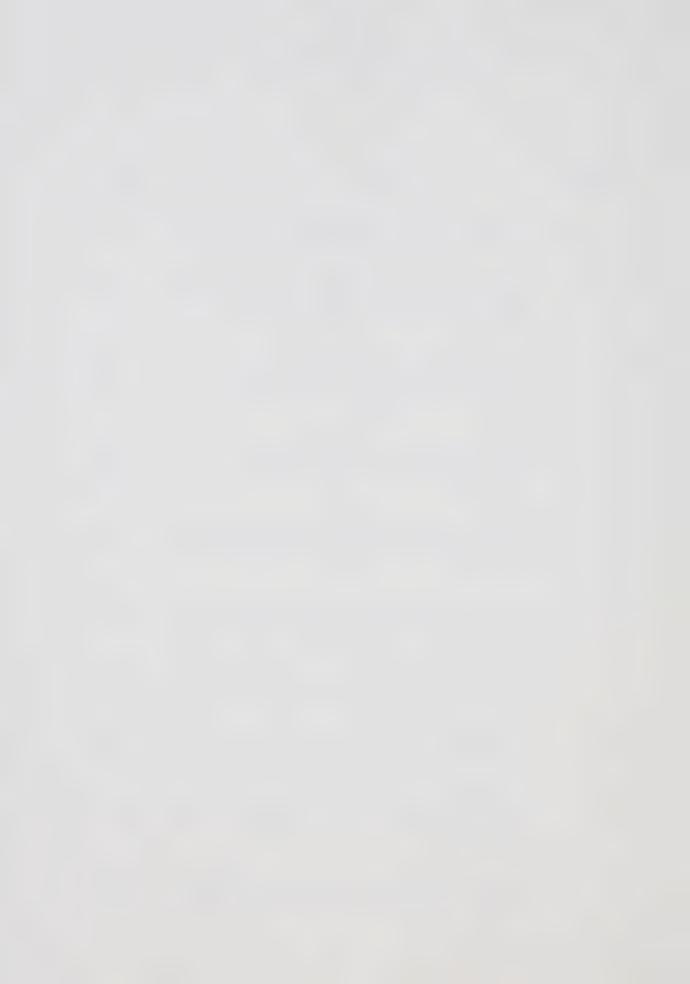


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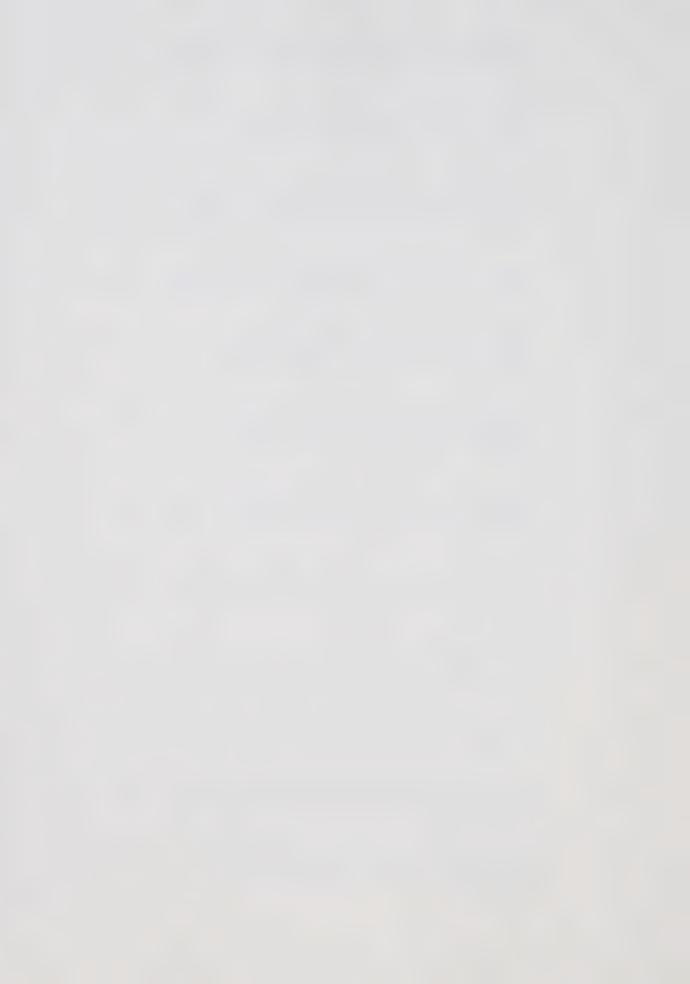
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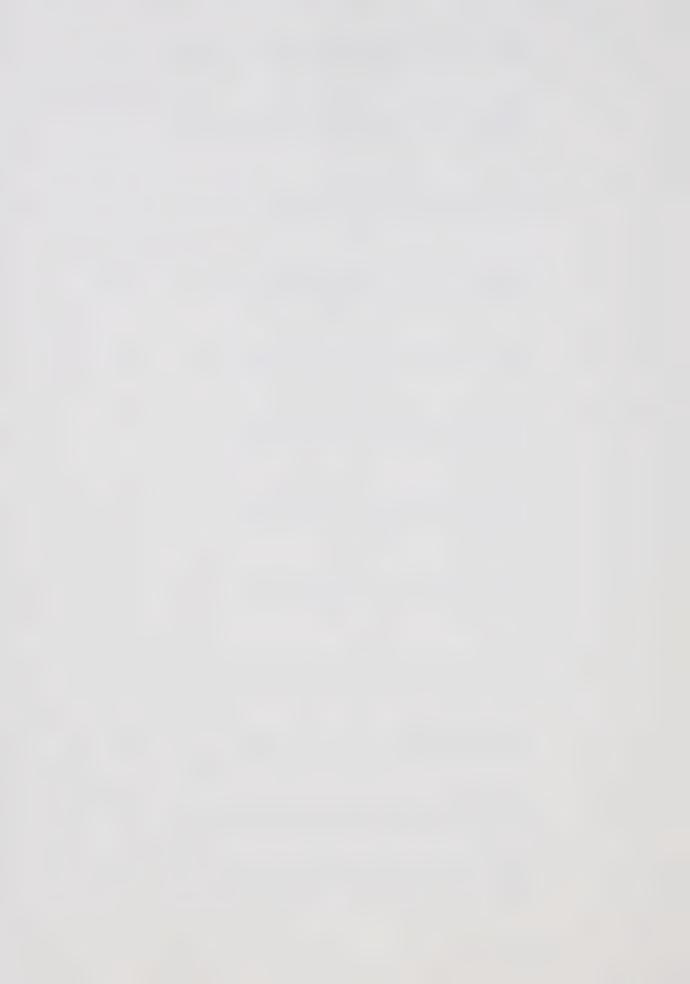
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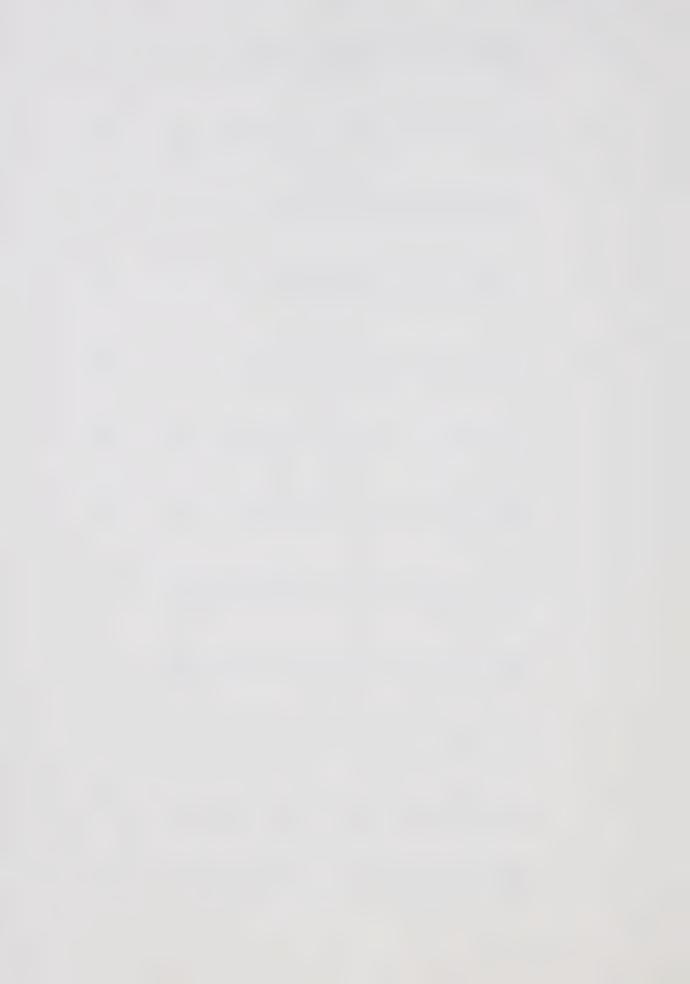
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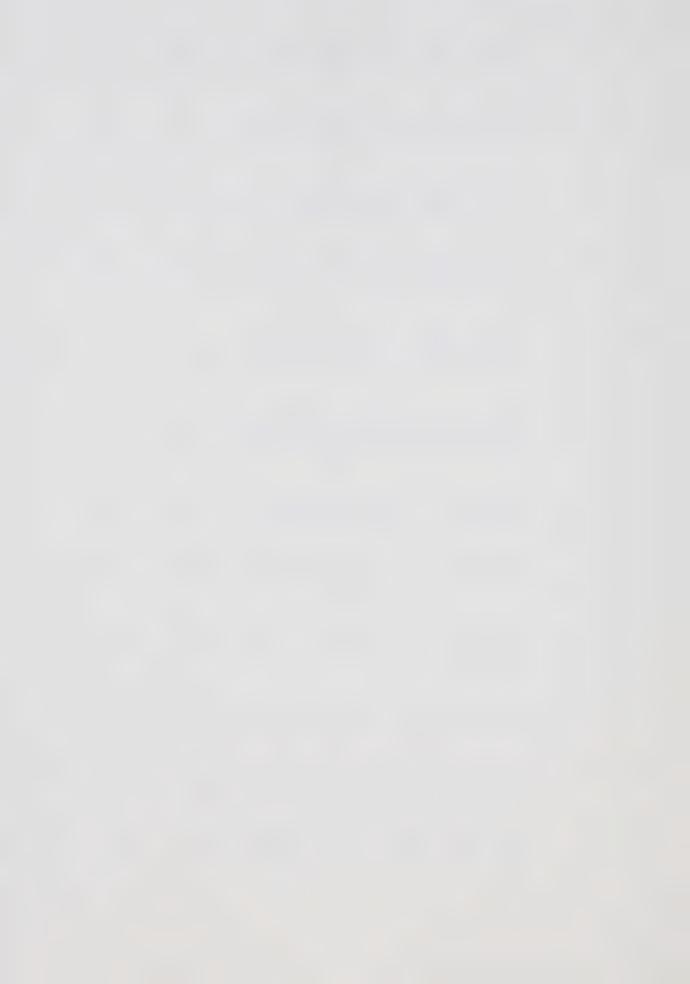
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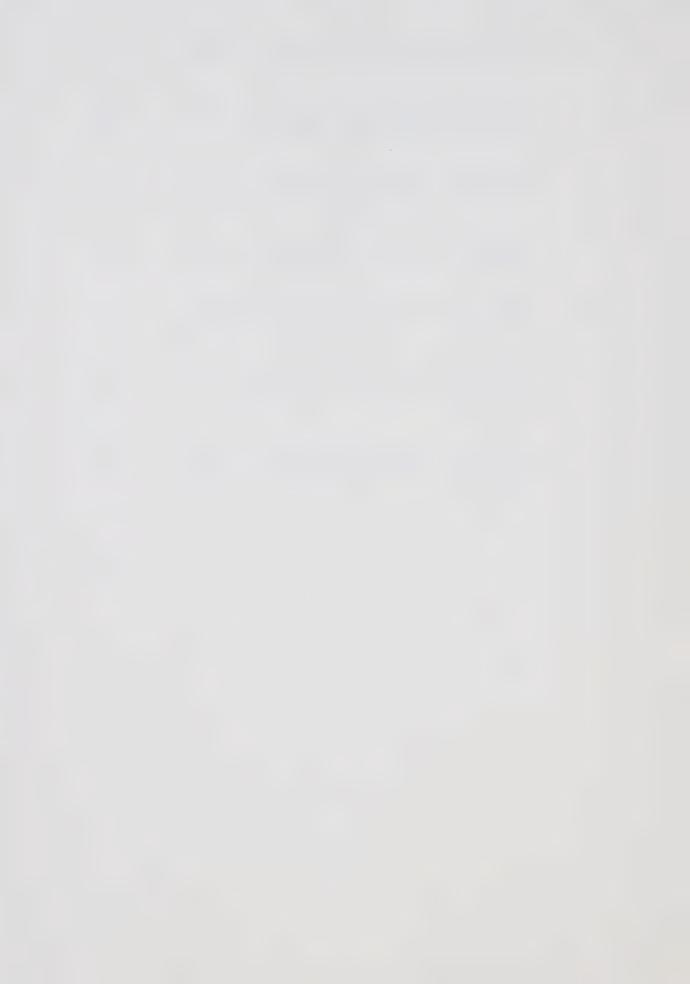
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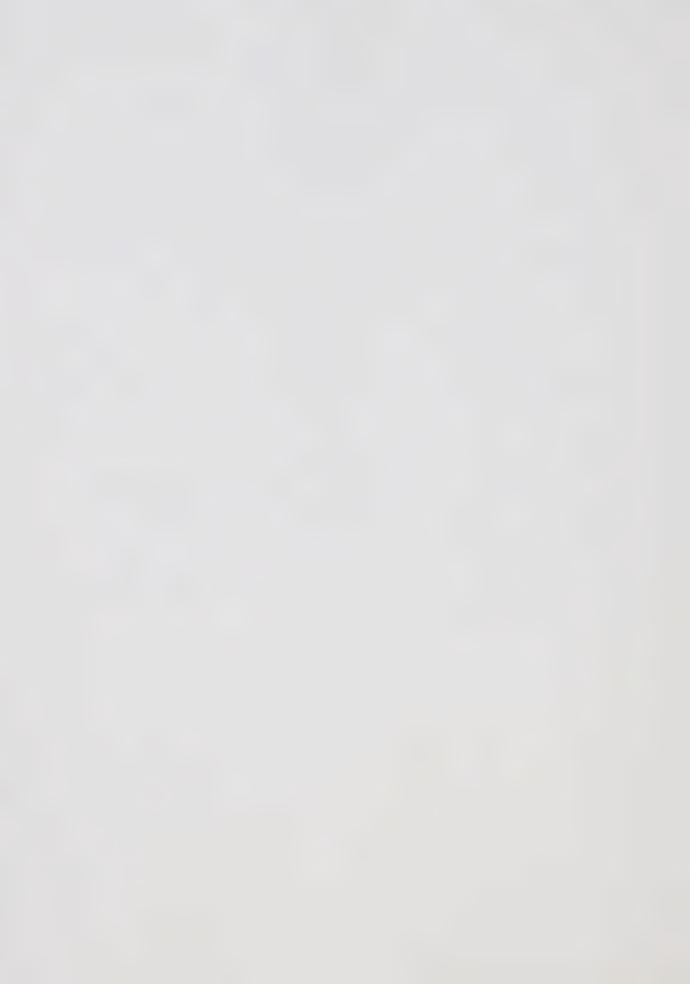
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I. Introduction

The following research considers the ways in which we measure juvenile crime. Specifically, the thesis incorporates suggestions from the general crime measurement literature and develops a juvenile crime measure which is sensitive to factors not usually considered. Juveniles are expressed as a ratio to adults, with two specific controls introduced. Both juvenile and adult rates are calculated using age specific population bases, and juveniles who have been handled informally by the police are counted as part of the numerator. Thus, the proposed measure takes into account both shifts in the age composition of the population and the possibility of juvenile diversion.

The report is organized into the following sections: theoretical statement and research problem, methodology, findings, and conclusion. In addition, the appendices contain the actual ratio values and figures which display these values in graphic form.

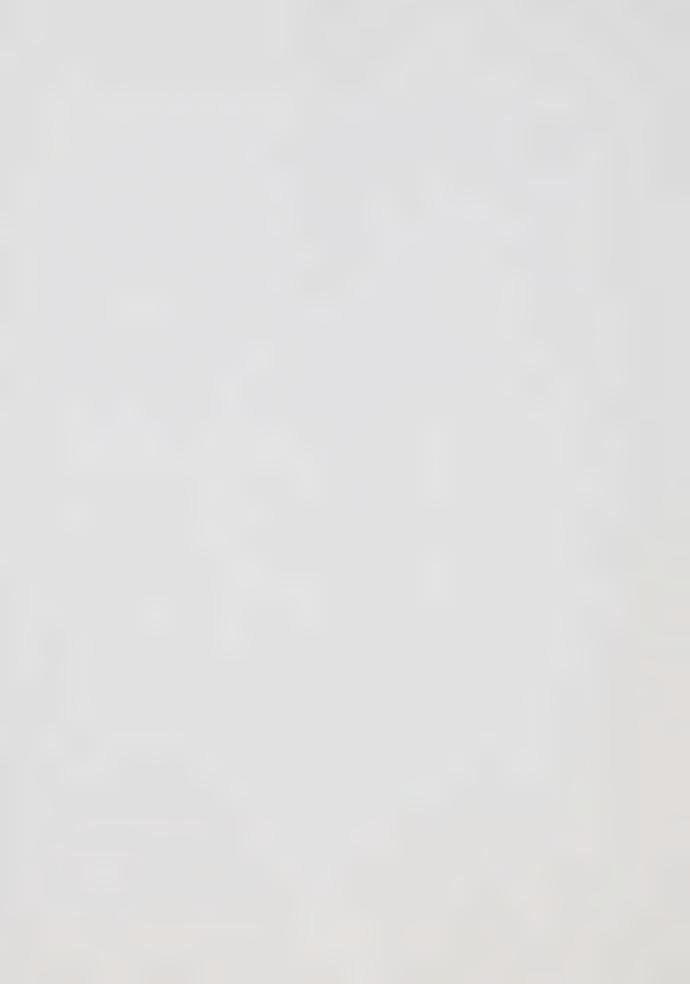


II. Theoretical Statement and Research Problem

A. Review of the Literature

Within criminology, a body of literature has been generated dealing with various aspects of crime measurement. There seems to be general agreement that the measurement of crime volume is at best problematic. Conclusions range from suggestions of a complete abandonment of the use of official crime data to a recognition that official data are the best indicators of crime volume available, despite the admitted flaws. One area that has been relatively unconsidered is the effect that diversion or population shifts have on the meaning of juvenile crime rates.

According to Giffen (1976), "...many discussions of criminal statistics begin with the expression of grave doubts about the reliability of the official figures, and then present these statistics in various combinations as if they faithfully portrayed the real world" (p.66). Thus, researchers within criminology are faced with the dilemma of whether official data should be used or abandoned as a valid indicator of crime. "In any event, crime statistics collected and published by Statistics Canada are the only statistics collected on a national basis in the country. Thus, for many purposes, they must be used by default. When used, however, their deficiencies must be kept in mind. If used with caution, they can provide a useful social indicator of one definition of crime in Canada" (Silverman



and Teevan, 1980:70). Moreover, further analysis of official data may serve the purpose of exposing possible problems with the official data and indicate areas in which concept clarification or scoring procedures warrant a thorough review. This is, in fact, a major intent of this thesis.

In order to accomplish this task, however, it is necessary to delineate the general shortcomings of official data, so that these act as qualifications in interpretation. Nettler (1978) believes: "A critical attitude toward tallies of social events does not mean that one dispenses with statistics; it only makes one careful about using them. In criminology, those who take such an attitude must admit that the 'real' amount of crime is never known" (p.58).

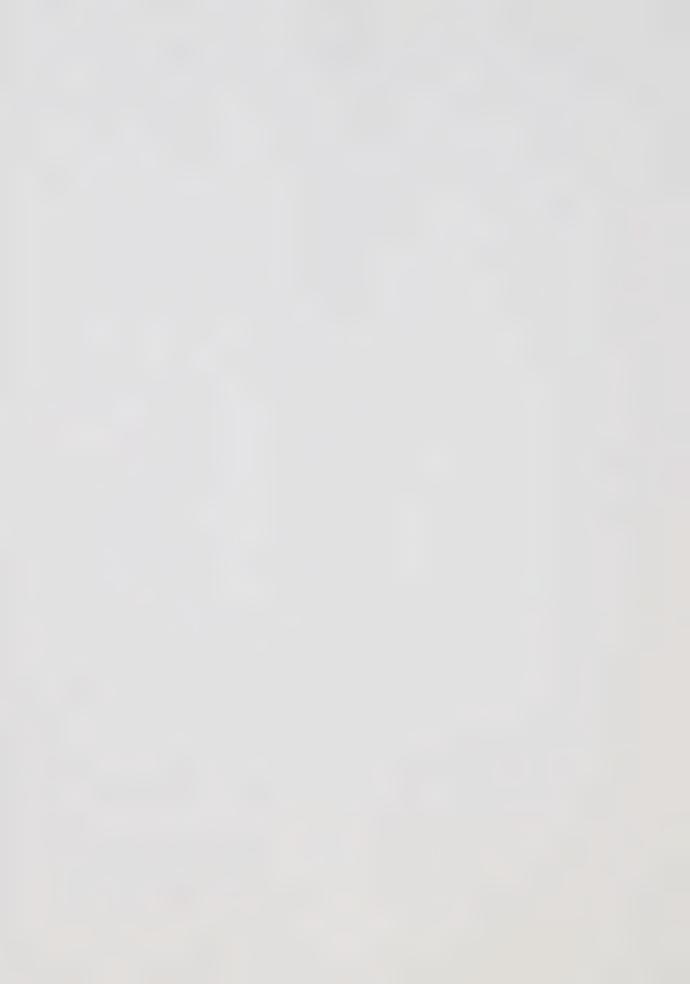
Literature that directly pertains to the investigation of juvenile crime measurement can be grouped into four distinct, yet interrelated, categories: the crime funnel, uniform crime reporting rules, the utilization of rates, and police diversion of juvenile offenders. These categories will be discussed separately, although it must be stressed that a certain degree of overlap exists between the categories that serves to compound the problem. For example, counts of who have progressed through the crime funnel may be biased by uniform crime reporting ambiguities.

The Crime Funnel

Simply stated, this concept refers to the notion that, in moving through the criminal justice system, there may be a halt in proceedings against individuals or loss of

information about events. Consequently, official statistics underestimate the real level of crime, since they are produced at the bottom stages. Silverman and Teevan (1980) have categorized the stages of this attrition of cases within the criminal justice system: "...not all actual crime is detected, not all detected crime is reported, not all reported crime is recorded, not all recorded crime results in arrests, not everyone arrested is brought to trial, not everyone tried is convicted, and not everyone convicted is sentenced" (p.63). In fact, the Solicitor General of Canada (1979) has produced a report which estimates the actual drop in number at the various stages. From juvenile self-reports, an estimate was derived of the number of persons that committed an offence. Only one-fifth of these persons are contacted by the police; one-third of those are charged; three-quarters of those are convicted; and one-thirtieth of those are incarcerated. The overall result is that only about one in every six hundred people that commit an offence are eventually incarcerated. In the United States, it has been estimated that only 45% of violent offences are reported to the police, and only 25% of theft offences are reported to the police. The major reason given for this lack of reporting was the victims' belief that the offences were unimportant or that nothing could be done (United States Department of Justice, 1981).

The point of our concern begins where crime comes to the attention of the police, since it is at this stage that

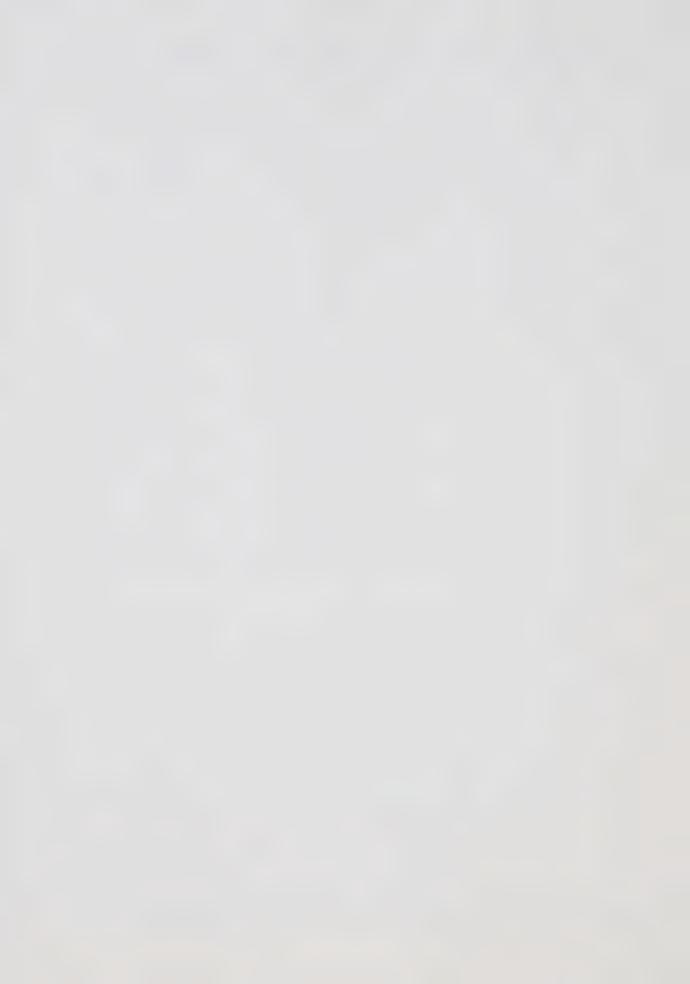


numbers become available. It has been determined, through the comparison of self-report and victimization studies to officially reported crime, that a large amount of crime never gets reported to or discovered by the police.

The question subsequently arises as to whether the official police statistics accurately represent fluctuations in crime, since all crime is not picked up in these data. The difference between the actual amount of crime and the recorded amount of crime is commonly referred to as the "dark figure" of crime. For more detailed discussions concerning this dark figure of crime, see Biderman and Reiss (1967), Black (1972), Ferracuti, Hernandez and Wolfgang (1962), McClintock (1970), Nettler (1978), Silverman and Teevan (1980), Sellin and Wolfgang (1964), Skogan (1977), Wolfgang (1963). The general conclusion seems to be that official data are an underestimation of real crime volume, although the actual degree of this underestimation remains in question.

Skogan (1981) discusses some methodological problems associated with victimization surveys. Among the problems mentioned by Skogan are sampling error, interviewer differences, underestimation by proxy respondents, memory bias (forgetting and forward telescoping), and the withholding of information when friends or relatives are involved. The methodological problems associated with victimization surveys make them imperfect measures, and thus

¹ Two victimization studies indicating this which were carried out in Canada are Courtis (1970) and Koenig (1977).



we may question their precision.

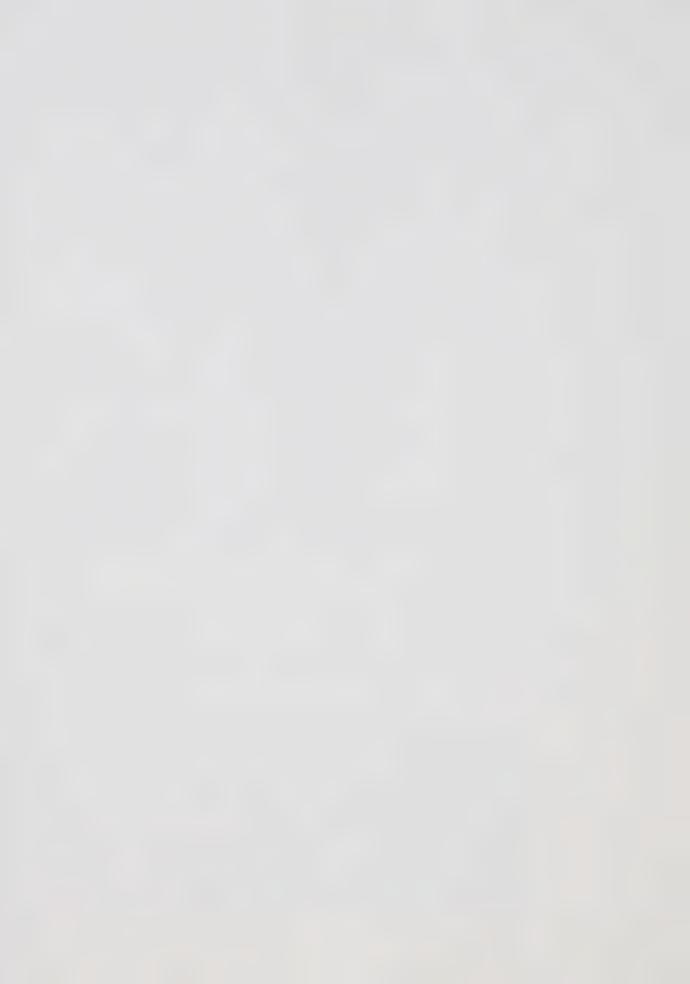
On the other hand, in a comparison of survey data on crime and the official measure of crime, Skogan (1974) has found that: "A direct comparison of survey estimates of crime and official reports of crimes known to the police suggest a more optimistic picture of the status of crime statistics as social science data" (p.33). On the same subject, Nettler (1978) states that: "official and unofficial counts of crime are in general agreement in mapping the social locations of serious offenses" (p.75).

In spite of the relative confidence in these pictures of crime, it is not of much use for the task at hand. Victimization surveys do not collect information about offender characteristics, and since we are concerned about juvenile crime, there is no way of identifying them. It is in the next stage, the recording of incidents, that problems relevant to this thesis emerge.

Uniform Crime Reporting

Akman and Normandeau (1967) have succinctly grouped the major objections to the present state of uniform crime reporting:

"The Canadian Uniform Crime Reporting (CUCR) system, like most other criminal statistic compilation systems, has a good number of shortcomings. Among these, the major one undoubtedly is the inability of the system to account for the qualitative aspect of criminality. The system (a) is wholly dependent upon legal descriptions of criminal events which obscure important qualitative differences among offences recorded



under different categories, as well as those recorded in the same category; (b) includes in the same category attempted criminal acts (which usually cause little if any harm) and completed criminal acts; (c) assigns the same weight (a unit of one) to all offences, petty and major offences alike: (d) tabulates composite criminal events (i.e. where more than one offence has been committed simultaneously) under the heading of the most serious one, and thus fails to take into account the cumulative seriousness of such criminal events: and finally, (e) records in a "catch all" category described as "other criminal offences" a great variety of offences ranging from "public disturbance" to "wilful damage" to "kidnapping"" (pp.323-324).

In addition to these problems mentioned by Akman and Normandeau, there are several other problems with uniform crime reporting that are worthy of mention.

There is a difference between violent and property crimes in the rules for counting offences. One offence per victim is scored for violent crimes; while for property crimes, one offence is counted for each separate and distinct operation.

Another problem exists where one offender may commit several offences during any specified time frame. For instance, for the category of juveniles not charged, Statistics Canada (1978) warns: "This total would not necessarily be an unduplicated count as a juvenile could be involved in more than one offence during the year or could have committed delinquencies in more than one jurisdiction during the reporting month" (p.21).



It should be pointed out that there is no theoretical reason to suspect that juveniles are treated any differently than adults at this stage of recording crime. There is no reason to suspect that clerks or coders using U.C.R. rules would make differential decisions about juveniles.

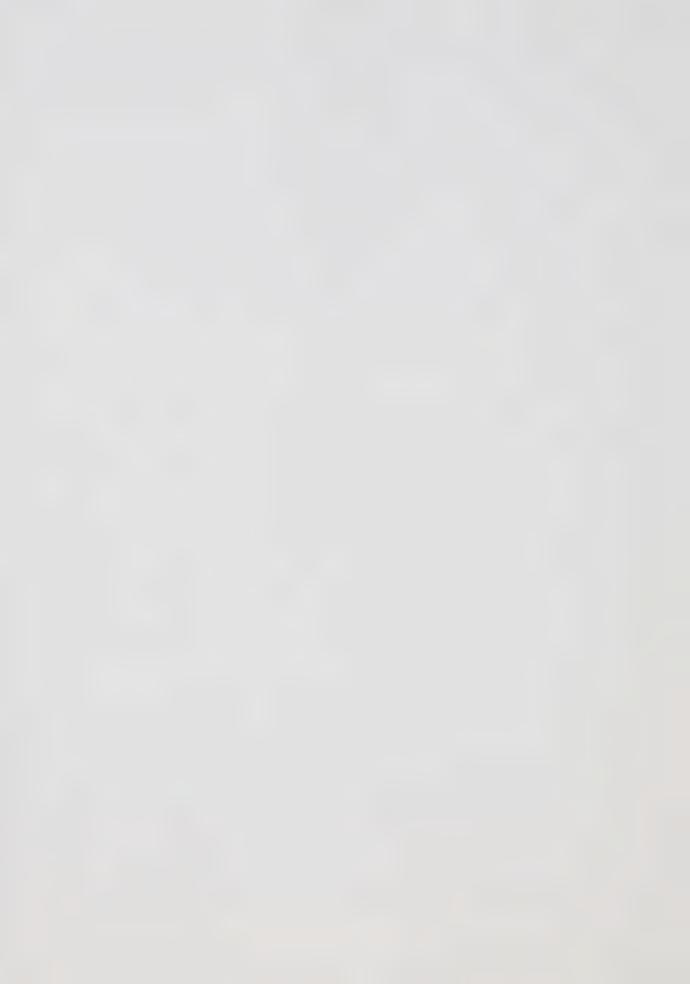
Therefore, it is assumed that there is no systematic bias operating in the recording of juvenile versus adult offenders. The next two sections outline considerations which have a stronger potential effect on juvenile crime measurement.

Crime Rates

It is generally acknowledged that the best way of reporting crime statistics is in the form of rates. "...when we want to make comparisons for a population over a period of time or comparisons between groups or between treatments, then absolute numbers become less satisfactory. ...We prefer to think in terms of ratios, proportions or rates, rather than absolute numbers" (Nettler, 1978:71). We tend to lose sight of the fact that the method of computing rates may also introduce error.

It has been maintained that rates should be age-specific. "Comparisons between populations become more accurate, then, when rates employed are age-specific..."

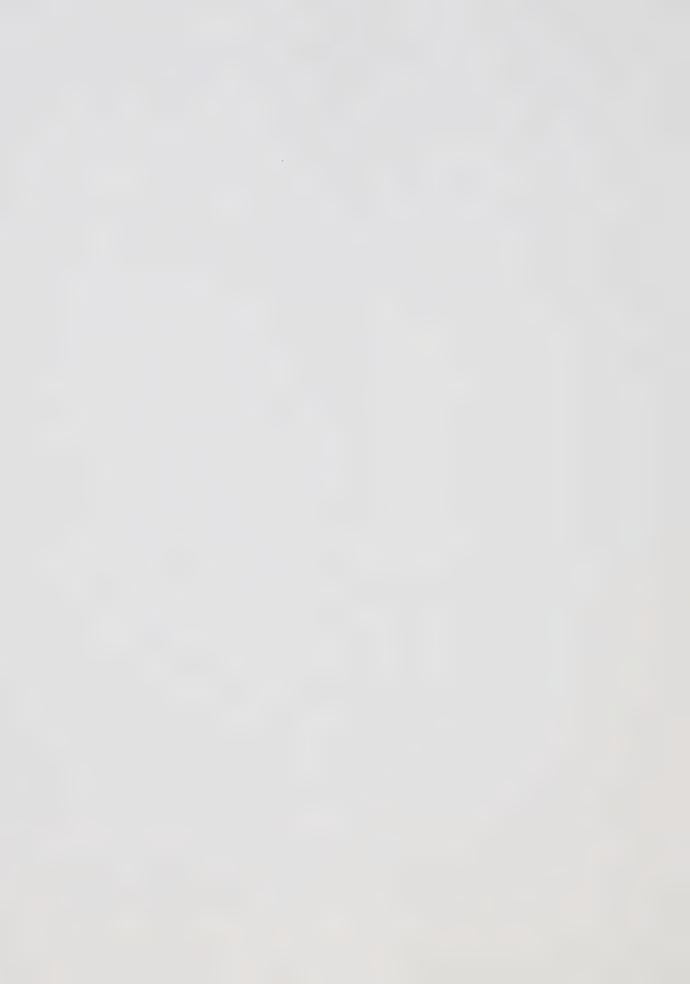
(Nettler, 1978:73). And again, "...even more important to crime rates than the absolute increase in population is the changing age structure of the population" (Morris and Hawkins, 1970:35). Sagi and Wellford (1968) maintain that



changes in crime volume can occur as the result of actual criminal productivity, total population changes, or changes in population composition. They found that much of what is interpreted as a rise in crime can be accounted for by changes in the age composition of the population.

Interestingly, the impetus to make use of age-specific rates occurred as the result of a rapid growth in the young age group, brought about by the members of the post-war baby boom reaching this age. It was maintained, in the 1960's and early 1970's, that the growth in the level of juvenile crime was in fact due to the population increase of this particular age group. "...there are no adequate grounds for thinking that there has been any very significant rise in juvenile crime rates; such evidence as is available strongly suggests that the overall increase in juvenile delinquency can be largely, if not entirely, attributed to juvenile population increase" (Morris and Hawkins, 1970:151). Wolfgang, Savitz and Johnston (1970) also refer to this phenomenon: "Crime rates are influenced by the age distribution of the population. ... Thus, crime rates could increase as a result of demographic changes...even without an increase in the criminality of any population subgroup. ... Most interpretations of crime statistics fail to identify the exposure rate associated with the intended interpretation" (p.102).

These suggestions and observations still hold true, even though the trend has now become reversed, with fewer



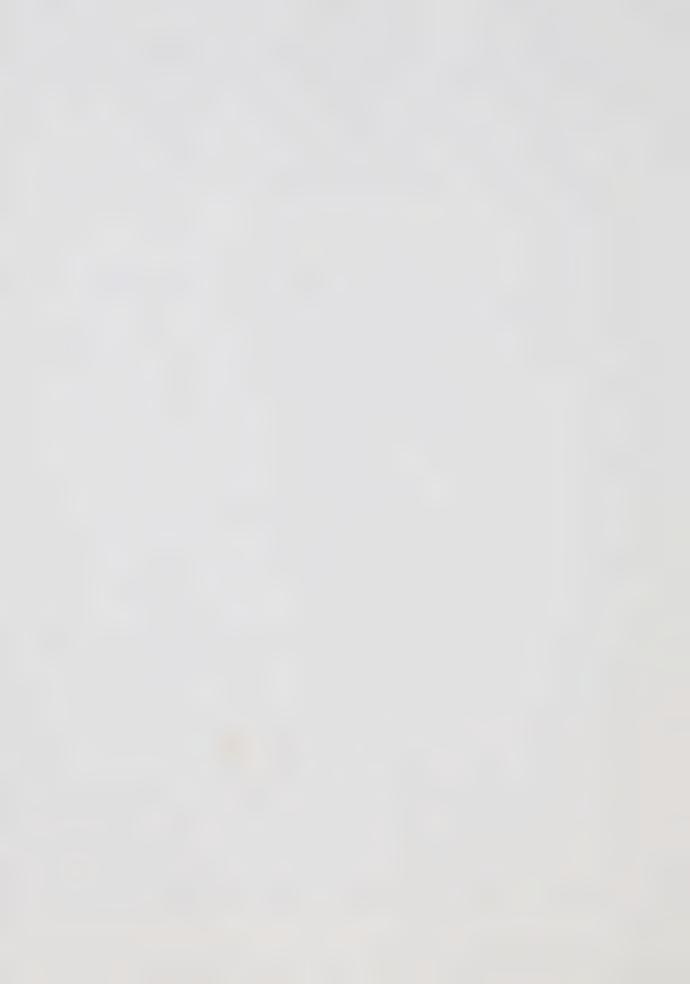
individuals now falling into the officially defined juvenile age group than was the case when the suggestions were put forth. The basic point, however, remains unchanged.

Age-specific rates control for population composition changes, and as a result, should be used to assess crime changes.

Diversion

The Solicitor General of Canada (1977) has proposed the following definition of diversion: "Diversion consists of processes and programs at the pre-trial level, established as alternatives to the formal procedures of the court for dealing with persons who come into conflict with the law" (p.32). Jensen and Rojek (1980) identify five rationales which have lead to the increased popularity of police diversion of juvenile offenders: theoretical precedents (labelling and differential association), juvenile rights and due process, economics, the professionalization of police work, and the attack on detention (pp.334-343).

Diversion is essentially the result of some exercise of discretion. "Discretionary power has been defined as follows: To evaluate the degree of danger to society represented by an offender and decide. In each instance, if this evaluation overrides the interests of allowing the offender to remain free until trial, or if the matter should simply be forgotten" (Solicitor General of Canada, 1977:16). Jensen and Rojek (1980) indicate four points within the criminal justice process at which discretion can result in

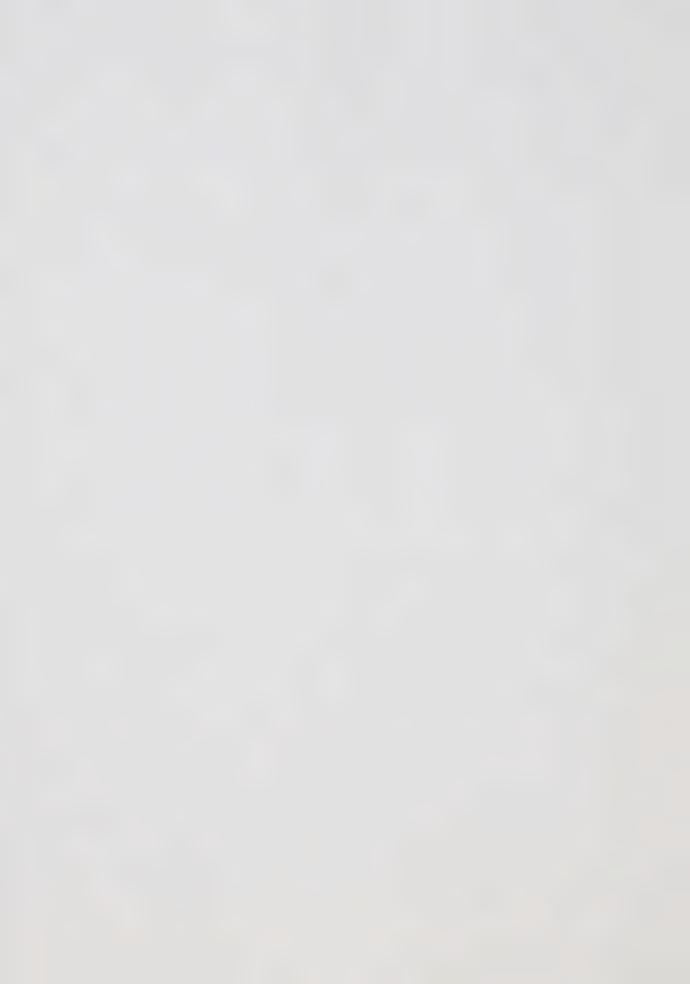


diversion: citizen discretion, police discretion, juvenile court intake discretion, and judicial discretion (pp.344-346). The subject matter of the present research is exclusively the second of these: police discretion. It is at this point that statistics are produced.

Unfortunately, there seems to be a distinct lack of literature that refers to the effect of police diversion of juvenile offenders on the production of official crime statistics. The majority of diversion literature has concentrated on how the individual police officer or department make the decision as to whether to charge or not charge a juvenile offender. These works have attempted to isolate the significant explanatory variables of the police-juvenile offender-victim/complainant on the street encounter and indicate which variables possess predictive power.

Moyer (1980) has reviewed the literature concerning police discretion under three headings: social-psychological variables, legalistic variables, and variables concerning characteristics of police departments and communities.

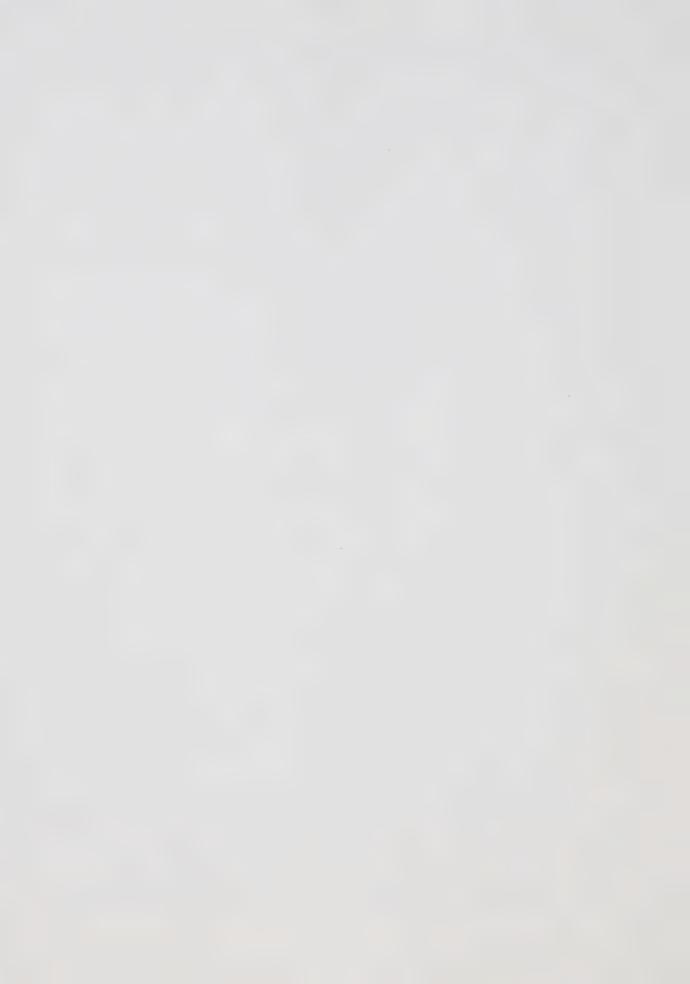
In what has become somewhat of a classic study, Black and Reiss (1970) identified two social-psychological variables which influenced police decisions to either arrest or divert juvenile offenders: the expressed preference of the complainant or victim and the evidence of guilt. Other studies which have concentrated on social-psychological variables include: Cicourel (1968), Emerson (1969),



Ferdinand and Luchterhand (1970), Garrett (1972), Garrett and Short (1975), Harris (1967), Hirschi (1969), Howard (1972), Piliavin and Briar (1965), Reiss (1971), Shaw and MacKay (1931), Skolnick (1966), Sullivan and Seigel (1972), Werthman and Piliavin (1967), Westley (1970). Variables such as role or attitude of victim/complainant, attitude of offender, police officer's attitude toward the misconduct of youth in general, police officer's perceptions of the consequences to both himself and the suspect, and police officer's desire to avoid negative sanctions for making the wrong decision have been shown to be important social-psychological factors in determining the outcome of the encounter (Moyer, 1980).

Legalistic variables have been investigated by Bodine (1964), Bordua (1967), Goldman (1963), Harris (1967), McEachern and Bauzer (1967), Monahan (1970), Shannon (1963), Terry (1967a,1967b), Thornberry (1971,1973), Weiner and Willie (1971), Wellford (1974). The review of legalistic vs. particularistic variables has led Moyer (1980) to conclude: "...variables such as complainant behaviour, perceived seriousness of offence, and past police contacts are more important in the decision to arrest young people than social class, race, or demeanor" (p.39).

Finally, characteristics of police departments and communities have been examined by Bottomley (1973), Emerson (1969), Gandy (1967,1970), Harris (1967), Kupperstein (1971), MacEachern and Bauzer (1967), Sellin and Wolfgang



(1964), Sundeen (1972), Wilson (1968a,1968b). Concerning characteristics of police departments and communities, Moyer (1980) states: "It appears obvious that the structure, policies and working pressures of police forces affect decisions about juvenile lawbreaking. Unfortunately, researchers have not explained the ways in which these variables influence variations in court referral rates. ... Similarly, little systematic research has been done on the relationship between community and the exercise of police discretion. Thus far, no one has been able to relate in any systematic fashion differences in police discretion to specific community variables" (p.40).

No universal criteria exist within Canada concerning diversion. According to the Solicitor General of Canada (1977):

"It is generally accepted that the police handle their discretionary functions very well. There are, however, two schools of thought on the subject, one favouring guidelines and the other opposing them. Those who favour guidelines raised the following points:

- Diversion guidelines would promote uniformity and provide a knowledge base from which to develop programs. - Police officers must often act in situations and respond to demands which exceed their authority and

ability.

- Is it legal for a police officer to decide not to lay a charge when sufficient evidence is available? Those opposing guidelines held that:
- Discretionary decision-making has always been an inherent part of police work.

- Guidelines would be subject to interpretation and co-operation of



Crown prosecutors and judges.
- Police are now accountable for their actions in Diversion projects by standard supervisory procedures. They remain accountable to the courts"

(p.18).

In the preceding discussion of police diversion literature, a noticeable gap exists concerning the effect of police diversion on official statistics. Research has concentrated almost exclusively on the actual police-juvenile on the street encounter. Until there is a way of measuring diversion, the peripheral literature cannot be directly applicable.

Summary

The literature which has been outlined in this section applies indirectly to the research which is being carried out. Because a measure is being proposed which has never been discussed in any literature, there is obviously no literature with direct application. This situation, however, in no way detracts from the importance of the more peripheral literature which has been discussed. The notion of the crime funnel or the underestimation of the real level of crime is a problem that plagues any analysis of statistical crime data. Uniform crime reporting ambiguities in recording and interpretation apparently cannot be solved without a total revamping of the entire system of reporting. Age-specific populations will be utilized in an effort to control for compositional changes in population. Finally, diverted juvenile offenders will be included with charged

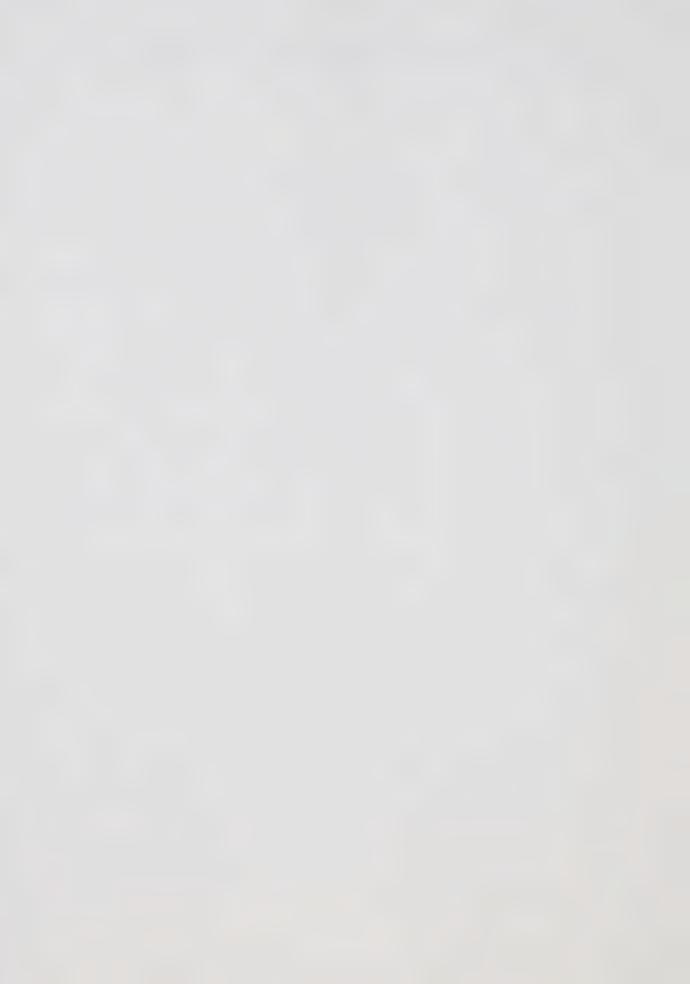


juvenile offenders to arrive at a total of recorded juvenile rule-breakers.

B. The Problem

As can be seen from the literature review, there are certain factors which must be addressed in any attempt to measure crime. Measurement within the criminal justice system is used to assess criminal justice activity and make subsequent conclusions about various aspects of crime volume. One such conclusion concerns the relationship between juvenile crime and adult crime. Juvenile crime volume is measured by using police statistics. These statistics measure police activity or persons dealt with by the police and recorded. From this measure of police activity, findings are generated concerning juvenile crime volume.

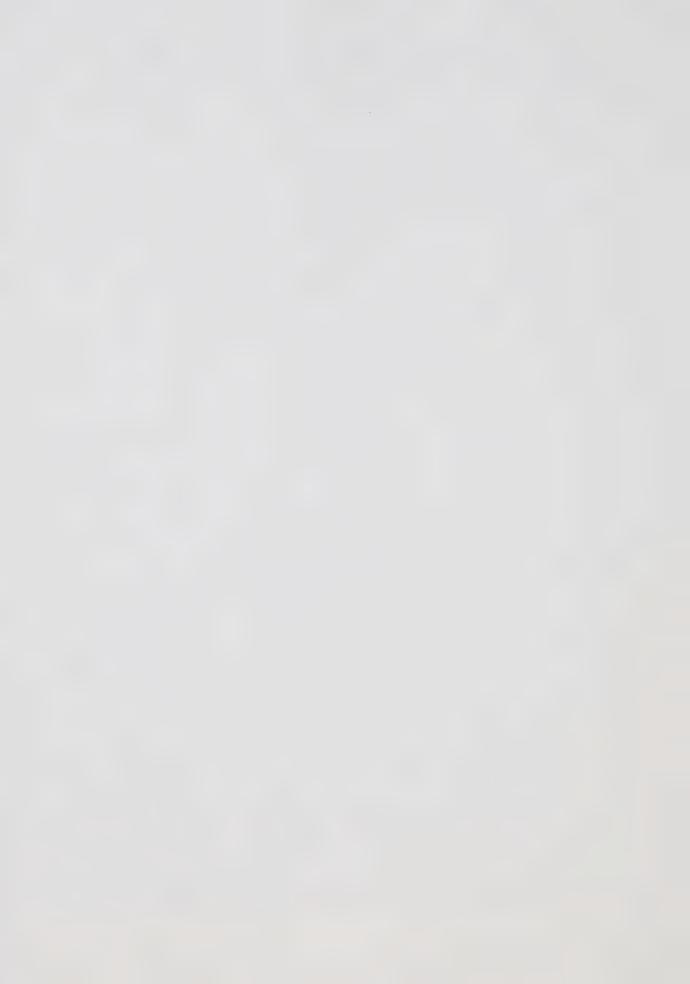
Traditionally, the extent of juvenile crime has been measured by expressing the total number of juveniles charged as a proportion of the total number of persons charged. In effect, this measure assesses juvenile offenders vis-a-vis adult offenders; it expresses juvenile charges as a ratio to adult charges. These statistics measure official offenders and do not include uncaught rule-breakers. Such uncaught rule-breakers obviously cannot be included in tallies of official offenders, since no details are available concerning these people (i.e. whether they are male or female, adult or juvenile).



In order to discuss police activity, a number of concepts must be clarified by specifying operational definitions. One such clarification involves defining the concept, "diverted juvenile offender." For the purpose of the research, an offender refers to an adult who has been charged by the police, or a juvenile who has been dealt with by the police, whether or not the juvenile has been charged by the police. It must be stressed that this concept is a behavioural definition and is in no way meant to be interpreted as a legal definition. The concept of diversion thus must be considered as it is used to refer to the police action of dealing with but not charging a juvenile. It refers exclusively to police diversion and does not consider other areas of the criminal justice system, such as juvenile courts. As a result, a diverted juvenile offender is a juvenile who has been dealt with by the police, but a police decision to not charge that juvenile has been made.

In addition, "traditional measure" is generally a simple unstandardized measure which does not control for juvenile diversion and population composition. On the other hand, the "new measure" includes controls for both population composition and juvenile diversion.

The traditional measure of juvenile crime fails to take into account at least two factors which may have a direct bearing on the interpretation: population and diversion. The age composition of the population of any given area may effect the probable incidence of offences. Police diversion



of juvenile offenders from the criminal justice system has the potential of increasing or decreasing the actual number of recorded juvenile offenders.

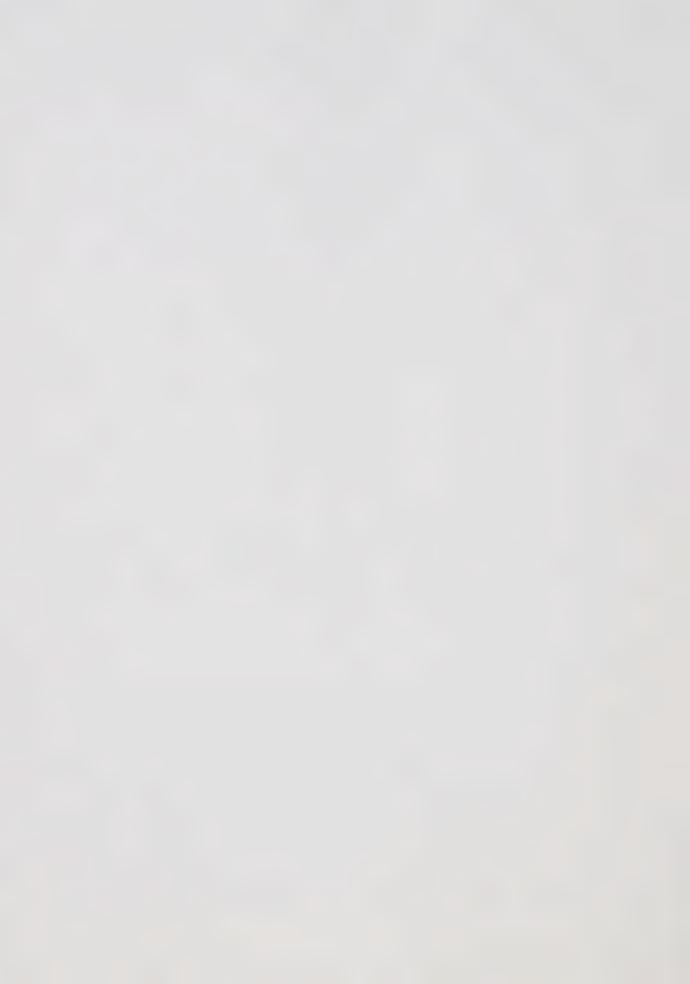
The goal of this research is to assess the effect of including each of these variables (population and juvenile diversion) on the traditional (unstandardized) measure of juvenile crime. Thus, three specific questions will be addressed:

- 1. What is the effect of including diverted juvenile offenders on the juvenile to adult offender ratio?
- What is the effect of basing the juvenile to adult offender ratio on age-specific populations?
- 3. What is the combined effect of diversion and population on the traditional juvenile to adult offender ratio?

Questions 1 and 2 are dealt with separately to determine the influence each variable exerts on the measure, and question 3 determines the overall influence of both of these variables.

<u>Juvenile</u> <u>Diversion</u>

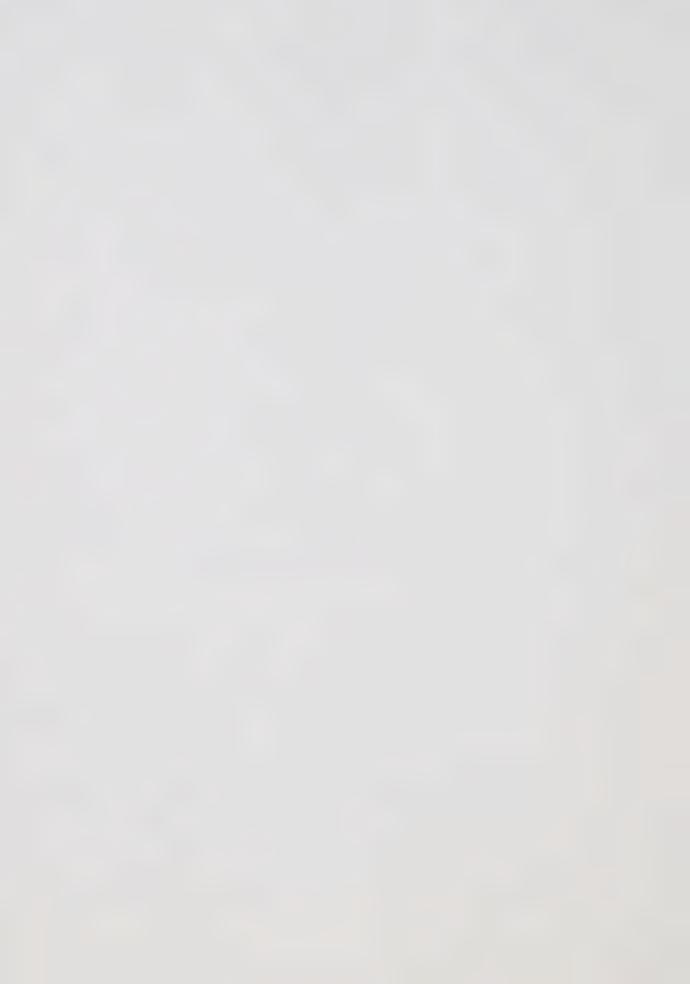
With the increasing popularity of police diversion of juvenile offenders, a growing number of "juveniles not charged" have been reported. These diverted juveniles may be offenders, even though no formal charges have been laid against them by the police. Consequently, diverted juveniles should be considered in the assessment of juvenile crime volume. In fact, their inclusion represents the first step



in deciding whether they are offenders. At the minimum, their inclusion influences the assessment of police activity. As a result, the reasons for including diverted juvenile offenders are to measure police activity, possible true crime volume, and to create a measure to eventually help determine whether this is a true reflection of juvenile activity or a measure of police arbitrariness. Between 1974 and 1978 in Canada, the ratio of diverted juveniles to charged juveniles ranged from .9 to 1.5 for violent crimes. This appears to be a significant number of offenders omitted from the measurement of juvenile crime volume. In fact, Statistics Canada Crime and Traffic Enforcement Statistical Report (1978) urged that diverted juveniles be included: "Because of varying practices used across Canada in dealing with juvenile offenders, the totals for 'juveniles charged' and 'juveniles not charged' should be combined to determine the number of juveniles dealt with by the police."

Population Composition

The population composition of Canada is in a state of fluctuation. One such compositional change involves the number of people officially defined as juvenile or adult at any given time for any given location. Between 1974 and 1979, the population of Canada operationally defined as juvenile actually decreased by approximately half a million (from 4,463,700 in 1974 to 3,943,700 in 1979), while the adult population increased by almost two million (from 15,414,400 in 1974 to 17,277,900 in 1979). As a result of



this shift in population, the probability of any given offender being adult or juvenile may have changed.

Summary

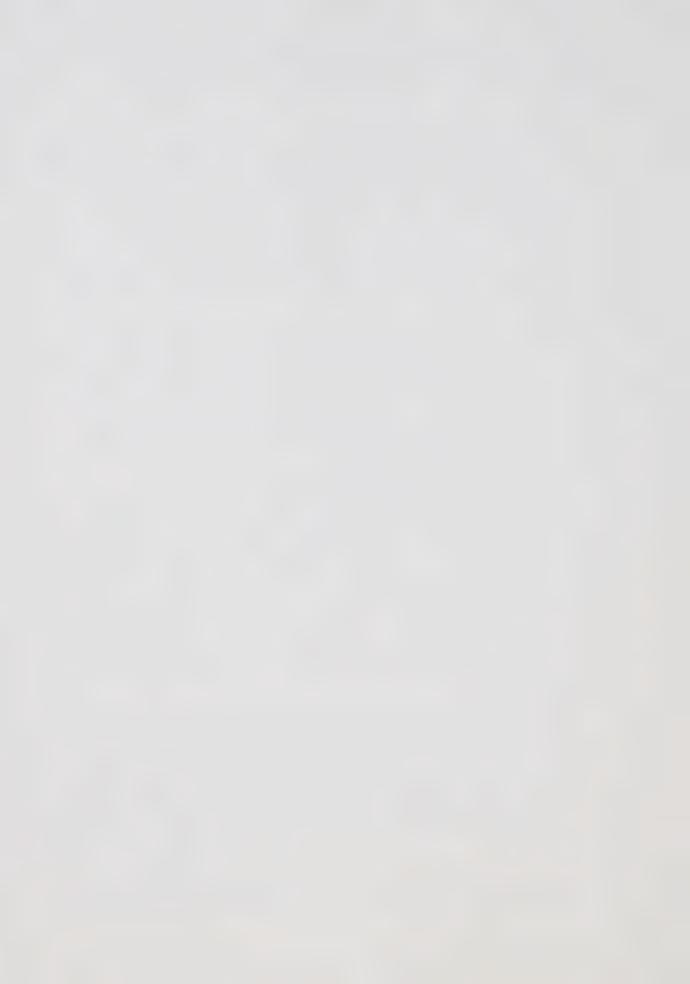
The problem to be dealt with is the effect of including diversion, population, and the combination of diversion and population on the measure of juvenile crime volume. To accomplish this task, data from Canada and the provinces and territories are investigated by offence type for the time period 1974 to 1978.

Canadian, provincial and territorial information is used to determine whether differences exist among these reporting aggregates. Varying provincial and territorial directives and programs can influence the nature of the reporting of juvenile offenders.

The data are analysed according to offence type to determine whether there are unique patterns involved for juveniles in certain offences. Violent offences, property offences and other offences are the three criminal code offence types. Presumably, violent offences are considered the most serious, followed by property offences and other offences.

The years 1974 to 1978 are considered because data are available for diverted juveniles only for this five year span. Also, these years represent a time when there was a certain amount of questioning and restructuring of juvenile legislation.

No male-female breakdown can be accomplished since



Statistics Canada reports only juveniles diverted and does not have separate categories according to the sex of the diverted offenders.

Since this research deals with the investigation of official police statistics concerning offenders, official data will be presented, not as absolute indicators of the actual amount of crime, but merely as potentially imperfect indicators of crime volume. Any conclusions drawn as a result of the data will be conclusions concerning one particular measure of crime, not necessarily conclusions about real or absolute crime volume.



III. Methodology

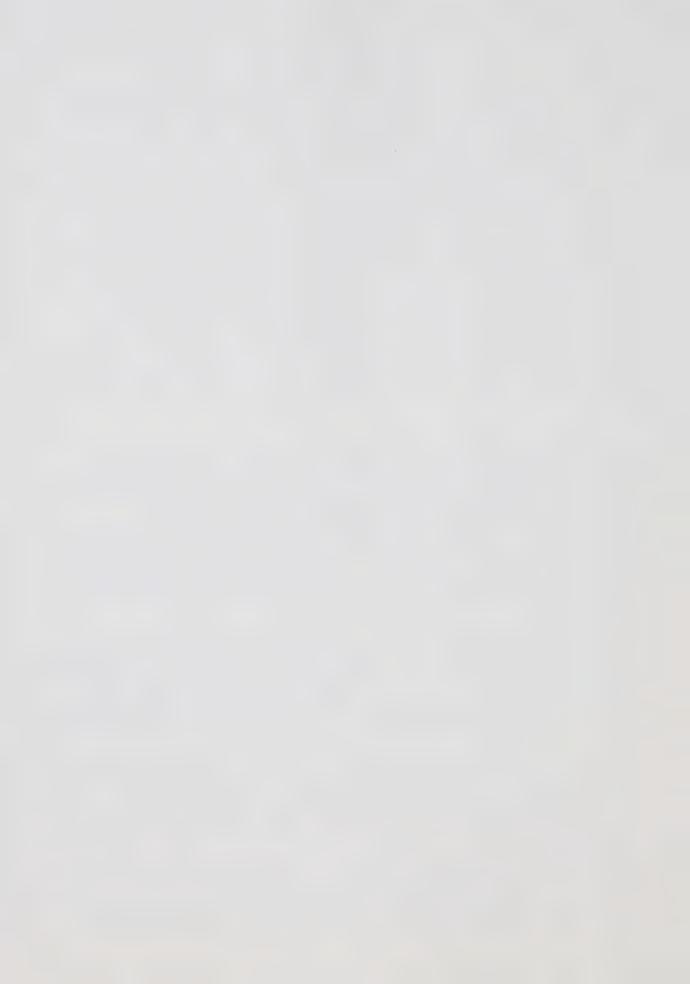
Since 1962, the Justice Statistics Division of Statistics
Canada has published information on the number of adult
males and adult females and juvenile males and juvenile
females charged by offence for certain reporting units and
aggregates. ²In 1974, however, a new column was added to
Uniform Crime Reports entitled, "informal". ³ This category
was subsequently renamed in 1978 to read, "not charged". ⁴
The numbers presented in this column refer to juvenile
offenders who have been diverted from the criminal justice
system, as a result of discretion exercised by the police. ⁵

² Reporting units refer to individual municipal police departments or R.C.M.P. detachments. Reporting aggregates refer to some combination of reporting units, for example, Alberta, Alberta R.C.M.P., Alberta rural, or Canada. ³According to Statistics Canada's interpretation instructions, juveniles informal "refers to any juvenile, who has committed a delinquency and has not been charged but given an informal hearing in Juvenile Court or handed over to his parents or guardian, a social agency or department concerned." (Crime and Traffic Enforcement Statistics, 1974, 1975, 1976)

⁴ According to Statistics Canada's interpretation instructions, juveniles not charged "refers to any juvenile who has committed a delinquency and has not been charged but referred for decision to a prosecutor, or other designated authority whether or not an information was subsequently laid or the police has exercised discretion and has decided not to charge." (Crime and Traffic Enforcement Statistics, 1978)

⁵ Some information from the Uniform Crime Reporting Manual (1979), which is issued by Statistics Canada, may serve to further clarify the diversion aspect of the category: "Concerning juveniles - the only time persons charged data are scored is when the police make the decision to charge the juvenile." (p. .../2)

[&]quot;Juveniles "Charged" - Columns 9 and 10
Record only those juveniles who are charged by the police and the decision to charge is a police decision." (p. 3.3.3)
"Juveniles "Not Charged" - Column 11
Read this heading as juveniles NOT charged by the police,



These data are available for Canada, the provinces and territories, and twelve metropolitan centres within Canada.

In addition, Statistics Canada publishes estimates of population by individual age for Canada, the provinces and territories on a yearly basis. From these data, estimates of juvenile population and adult population can be calculated. Populations are calculated as follows: Juveniles are defined as males and females from 7 years of age to 15 years of age with the exceptions of Newfoundland and British Columbia, which are 7 to 16; Quebec and Manitoba, which are 7 to 17; and Alberta, which was 7 to 17 for females and 7 to 15 for males until 1978, when it became 7 to 15 for both sexes. These figures are inclusive of the final year listed. Adults are defined as males and females over the juvenile age limit.

In order to carry out the data analysis, it was necessary to transform the information into machine readable form. Each province and territory, as well as Canada as a whole, is listed in an annual document, "Crime and Traffic Enforcement Statistics", published by Statistics Canada.

Offence categories were aggregated to offence types.

In order to accomplish the task of assessing the effects of diversion and population on the measure of

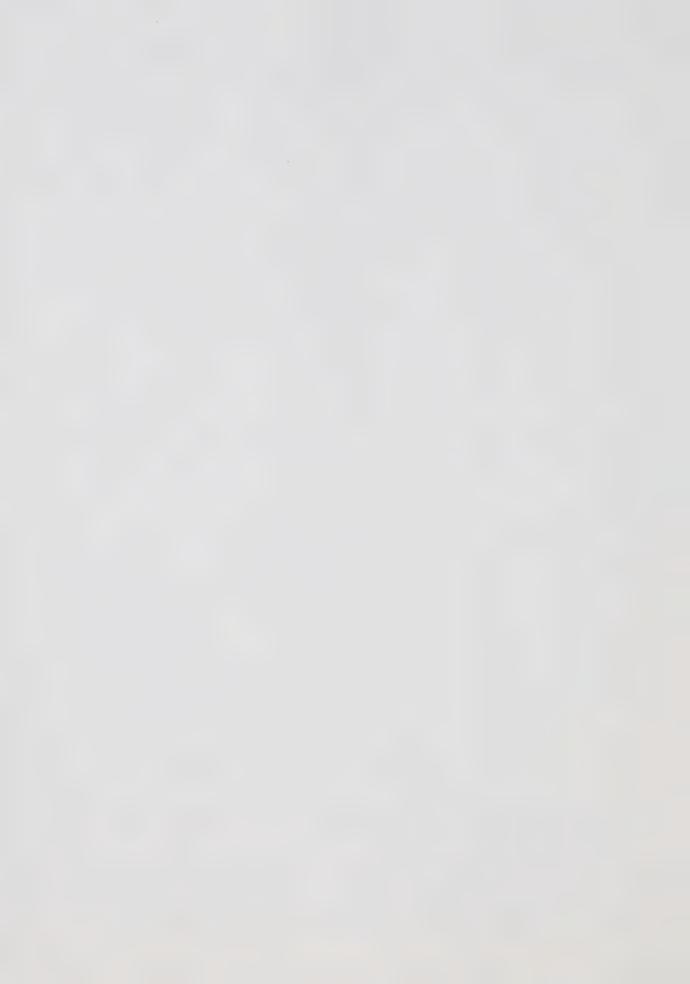
⁵(cont'd)Juveniles "Not Charged" is to record all other proceedings. These will include

⁽¹⁾ Referral for decision to:

⁽a) a prosecutor

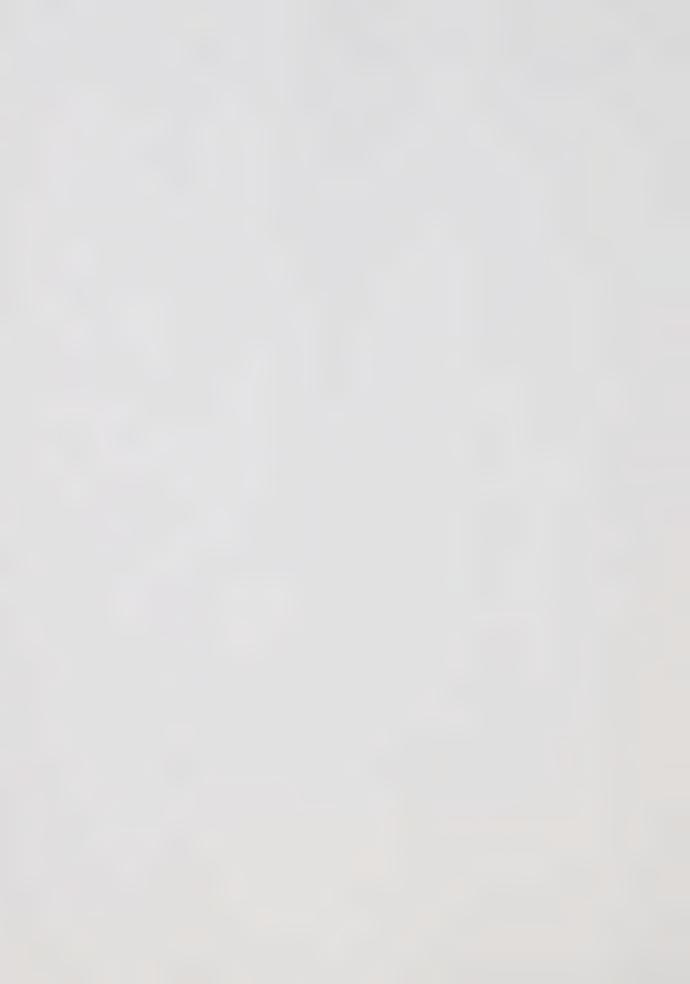
⁽b) any other designated authority whether or not an information subsequently laid.

⁽²⁾ All cases where the police exercise discretion and decide not to charge." (p. 3.3.4)



juvenile crime volume, a number of steps must be taken.

Assessing the effect of diversion and population on the ratio of juvenile to adult offenders essentially involves the calculation of three different ratios of juvenile to adult offenders. The first ratio represents the traditional means of assessing the extent of juvenile crime. Although there are perhaps no specific instances where this exact measure has been used, it represents the implied comparisons common in official measures of delinquency. It is a simple ratio of juveniles charged to adults charged. The second ratio controls for police diversion of juvenile offenders. It is a ratio of juveniles dealt with by the police to adults charged by the police. The third ratio controls for population. This ratio expresses juveniles per capita charged by the police to adults per capita charged by the police. By comparing the first ratio with the second ratio, the effect of diversion can be determined; and by comparing the first ratio with the third ratio, the effect of population can be determined. Finally, a fourth ratio incorporating both these factors was calculated and subsequently compared to the traditional ratio. This fourth ratio expresses juveniles per capita dealt with by the police to adults per capita charged by the police. The ratios are calculated as follows:



Ratio 1 (the traditional unstandardized measure)

R1 = (MJC + FJC) / (MAC + FAC)

where,

MJC=male juveniles charged

FJC=female juveniles charged

MAC=male adults charged

FAC=female adults charged

Ratio 2 (controlling for diversion)

R2 = (MJC+FJC+JNC)/(MAC+FAC)

where,

JNC=juveniles not charged

Ratio 3 (controlling for population)

R3 = ((MJC+FJC)/JP)/((MAC+FAC)/AP)

where.

JP=juvenile population

AP=adult population

Ratio 4 (measure incorporating population and diversion) R4=((MJC+FJC+JNC)/JP)/((MAC+FAC)/AP)

As a result of the preceding calculations, tables and graphs were prepared which display the following information:

(a) the effect of diversion on the traditional ratio of juvenile to adult offenders (ratio 2 compared to ratio 1);



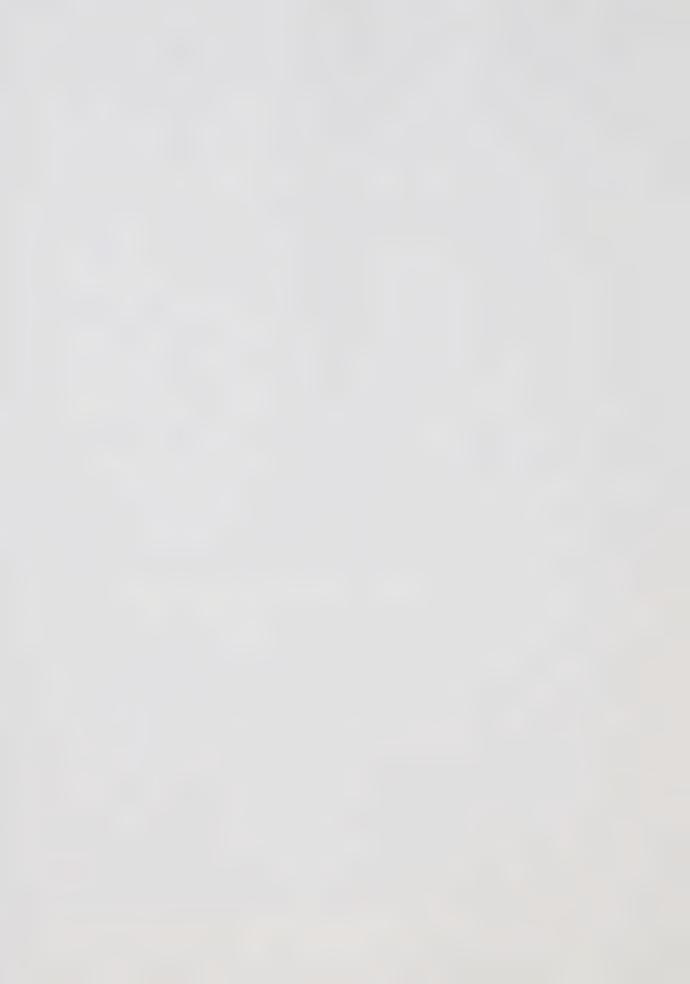
(b) the effect of population on the traditional ratio of juvenile to adult offenders (ratio 3 compared to ratio 1);(c) the combined effect of population and diversion on the traditional ratio of juvenile to adult offenders (ratio 4

compared to ratio 1);

(d) a new standardized ratio of juvenile to adult offenders with which to show the relative growth of juveniles and adults within the total crime picture (ratio 4).

The various measures are presented for violent crimes, property crimes and other crimes. It is believed that controlling for offence type yields more valuable information than is the case when all offences are considered together. Offences are compared using the new standardized juvenile to adult offender ratios (incorporating both population and diversion), in order to determine which offences appear to be predominantly juvenile or adult, and in order to ascertain trends concerning this new ratio.

The analysis is presented for the three major offence types: violent offences, property offences and other offences. Violent offences include the following offence categories: homicide, attempted murder, sexual offences, assault (not indecent) and robbery. Property offences contain the offence categories: break and enter, motor vehicle theft, theft over \$200, theft \$200 and under, have stolen goods and fraud. Other offences are made up of: prostitution, gaming and betting, offensive weapons and



other criminal code. For each offence type, the effect of diversion, population, and the combined effect of diversion and population is assessed for Canada and the provinces and territories from 1974 to 1978.

The research explores the official data for Canada, the ten provinces and two territories. Cross-Canada comparisons were made for the years 1974 to 1978. Unfortunately, these are the most recent data available in published form. Five years are used to check for random fluctuations.

By comparing the range of percentage increases in the traditional ratio after controlling for diversion, one can identify those provinces and territories that have undergone changes in police juvenile policies or reporting proceedures that have had a subsequent impact on official data. This is accomplished by subtracting the minimum percentage increase from the maximum percentage increase that took place as the result of controlling for diversion. The reporting aggregates which display high ranges of percentage increases are those which have undergone relatively significant changes.

In addition to the increasing effect that controlling for diversion has on the juvenile to adult offender ratio, this exercise can often alter the ranking of provinces and territories on this dimension. The ranking of provinces and territories is accomplished by taking the median ratio value from the five available years and ordering them from 1 which

denotes the largest ratio to 12 which denotes the smallest ratio. 6 Varying provincial practices concerning juvenile justice can alter the ranking of provinces depending upon which measure is used.

Although data concerning juveniles charged are reported under the categories male and female, no such information is published for juveniles not charged. Unfortunately, this lack of data rules out the possibility of comparison between male and female diversion for juveniles.

⁶ The median was used instead of the mean due to the skewness of the distributions.



IV. Findings

The analysis of the data consisted of comparisons of various juvenile to adult offender ratios. As a result, findings are presented in a purely descriptive manner.

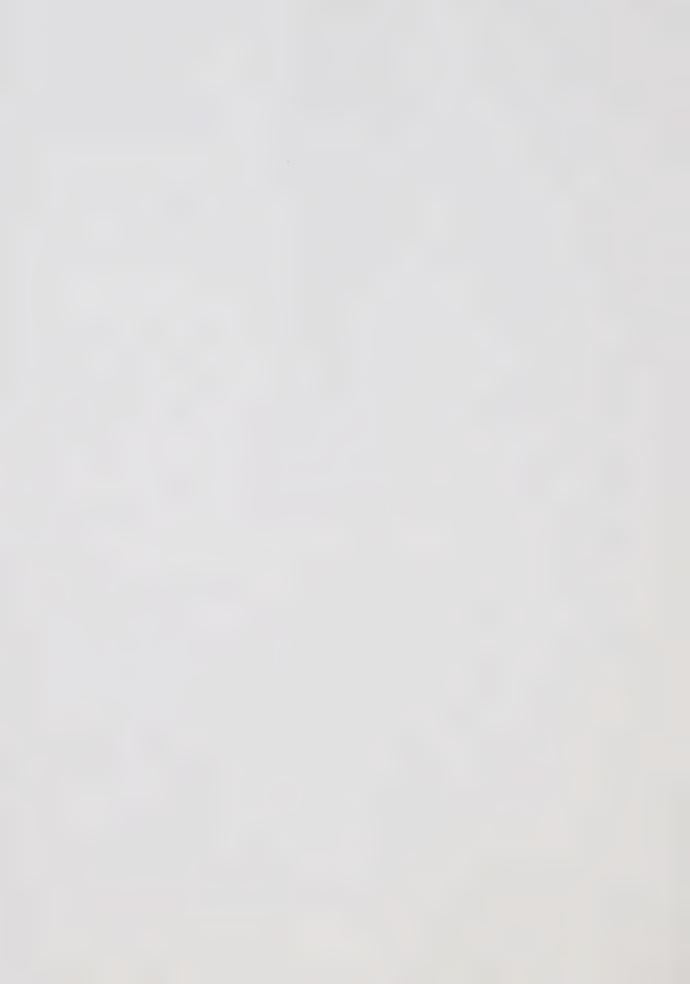
The ratio with which other ratios are compared is referred to as the traditional ratio. This ratio is a simple, unstandardized measure that expresses the ratio of juveniles charged to adults charged.

The first ratio which is compared to the traditional ratio is referred to as the diversion controlled ratio. This ratio controls for diverted juvenile offenders. Uncharged juvenile offenders are added to charged juvenile offenders and compared to adult offenders. The comparison of the traditional ratio and the diversion controlled ratio illustrates the effect of the inclusion of diverted juvenile offenders.

Secondly, a measure referred to as the population controlled ratio is compared to the traditional ratio. This comparison shows the effect of basing juvenile offenders on juvenile population and adult offenders on adult population.

Finally, a measure referred to as the new ratio controls for both diversion and population. By comparing the new ratio to the traditional ratio, the combined effect of juvenile diversion and population controls can be seen.

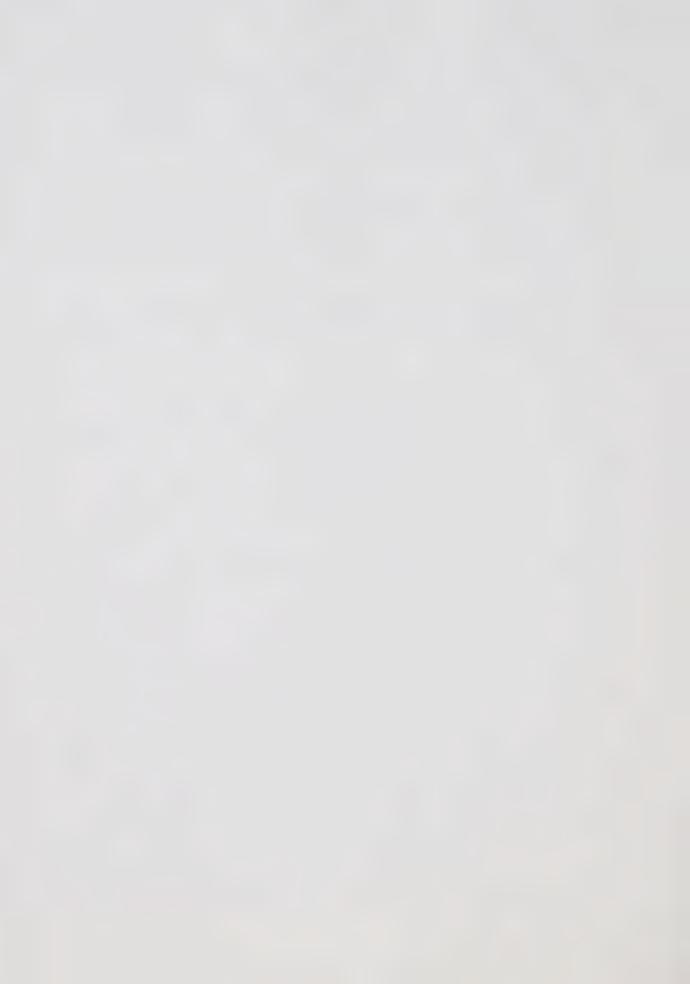
Moreover, it is maintained that this new ratio provides a broader measure of the extent of juvenile crime than any other measure that has been previously employed. This is due



to three factors:

- (1) it expresses juvenile crime volume as a ratio to adult crime volume, so that an overall increase or decrease in crime is not interpreted as only an increase or decrease in juvenile crime;
- (2) it includes diverted juveniles, who are offenders in a behavioural sense, even though they have not been charged by the police;
- (3) it is based on both juvenile and adult populations to take into account the changing age pattern of the Canadian population.

The findings are presented using both tables and figures. The tables can be used to determine the volume of the control effect, while the figures demonstrate the overall pattern of the control effect. The appropriate tables and figures for each section are listed following the heading. The tables immediately follow the first reference to them, while the figures are found in the appendices. There are two types of tables in the body of the report. The first type shows the minimum and maximum percentage increases in offender ratios that occur as the result of controls. In order to locate the year of the increase, the table should be used in conjunction with the figures. The second type of table displays median ratio values and ranking by province. Where ties occurred, the provinces which were tied were ranked the same. For example, if three provinces had identical ratios which were tied for third



highest among all provinces, these provinces all received a ranking of 3, with the next highest receiving a ranking of 6. Therefore, for each particular section of the findings, the specified tables and figures should be referred to.

A. Diversion

Violent Offences

Canada (Table 1, Figure 2.1)

Between 1974 and 1978, the inclusion of diverted juvenile offenders effected the juvenile to adult offender ratio by increasing it between 89% and 134%. Moreover, the increase in the ratio as the result of diversion appears to be growing, since the maximum increase of 134% occurred in 1978. From this, one can conclude that juvenile diversion for violent offences in Canada is increasing in popularity. While the traditional juvenile to adult offender ratio ranged between .08 and .09, the diversion controlled juvenile to adult offender ratio ranged between .16 and .21.



TABLE 1

Minimum Percentage Increase and Maximum Percentage Increase in the Traditional Ratio as the Result of Controlling for Diversion for Violent Offences for Canada and the Provinces and Territories, 1974-1978

Location	Minimum Percentage Increase	Maximum Percentage Increase
Canada	89	134
Newfoundland	17	72
Prince Edward Island	0	1,100
Nova Scotia	33	1,00
New Brunswick	15	75
Quebec	25	44
Ontario	217	280
Manitoba	19	37
Saskatchewan	200	234
Alberta	50	667
British Columbia	72	123
Yukon Territory	20	133
Northwest Territories	67	200

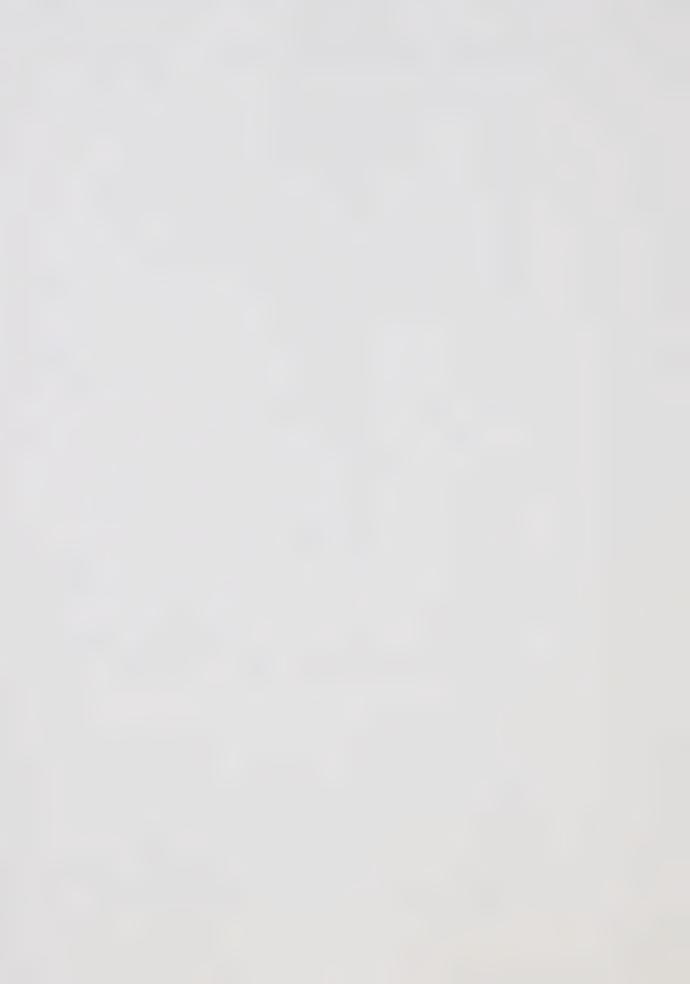


Provinces and Territories (Table 1, Figures 2.2-2.13)

With only one exception (Prince Edward Island, 1974), controlling for diversion functioned to increase the juvenile to adult offender ratio for all years analysed in all provinces and territories. Interestingly, Prince Edward Island also experienced the greatest single year increase as the result of diversion in 1976, when the ratio increased by 1100%. Alberta in 1978 also reported a massive increase to a level 667% greater than the traditional ratio.

Generally speaking, however, diversion appears to have been most popular in Ontario (217%-280%) and Saskatchewan (200%-234%), and least popular in Manitoba (19%-37%). This indicates that police in Ontario and Saskatchewan have a tendency to deal with juveniles on an informal basis, while police in Manitoba tend to charge a relatively high number of juvenile offenders.

Although diversion is displaying a general increase for violent offences in Canada, this pattern does not hold true for all provinces and territories. Saskatchewan and the Northwest Territories, for example, show indications that the popularity of diversion in these areas is



declining for violent offences.

The range of percentage increases, as the result of controlling for diversion, of 1100% for Prince Edward Island and 617% for Alberta indicates that these two reporting aggregates have experienced significant changes in reporting between 1974 and 1978. On the other hand, Manitoba (18%) and Quebec (19%) show a comparatively high degree of reporting consistency for violent offences.

Property Offences

Canada (Table 2, Figure 3.1)

Controlling for diversion for property offences in Canada functioned to increase the traditional juvenile to adult offender ratio by between 67% and 83% in the years 1974 to 1978. However, unlike violent offences, there does not appear to be any clear pattern as far as a general increase or decrease in the overall popularity of juvenile diversion for property offences. Both the traditional ratio and the diversion controlled ratio show evidence of an overall decline in Canada.

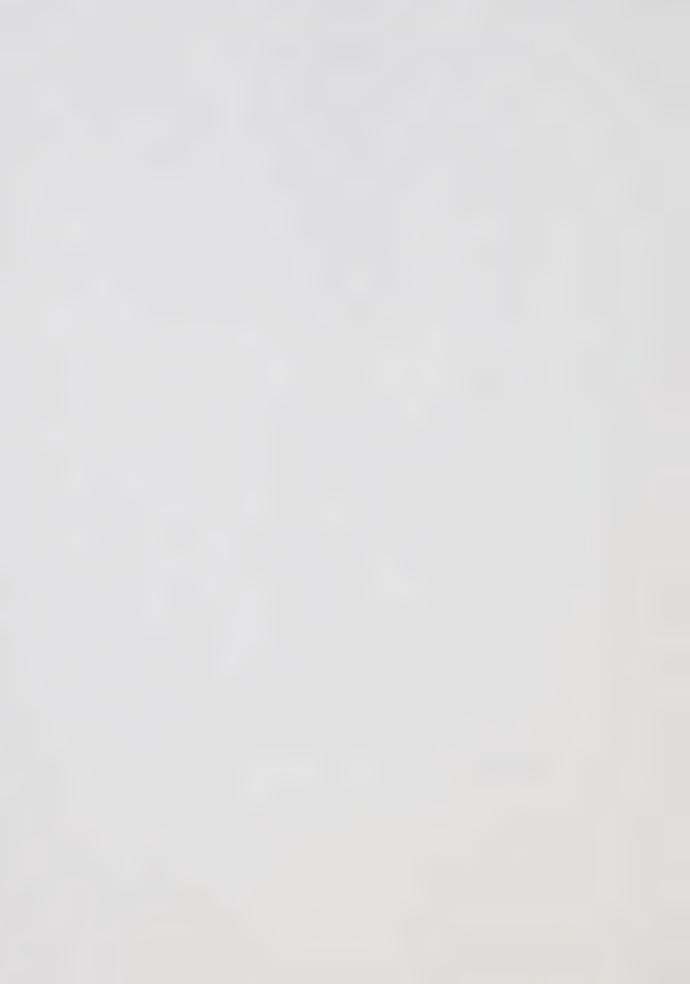


TABLE 2
Minimum Percentage Increase and Maximum Percentage Increase in the Traditional Ratio as the Result of Controlling for Diversion for Property Offences for Canada and the Provinces and Territories, 1974-1978

Location	Minimum Percentage Increase	Maximum Percentage Increase
Canada	68	83
Newfoundland	8	35
Prince Edward Island	18	104
Nova Scotia	15	32
New Brunswick	15	20
Quebec	16	25
Ontario	137	156
Manitoba	15	42
Saskatchewan	275	329
Alberta	46	145
British Columbia	56	100
Yukon Territory	32	121
Northwest Territories	80	205



Provinces and Territories (Table 2, Figures 3.2-3.13)

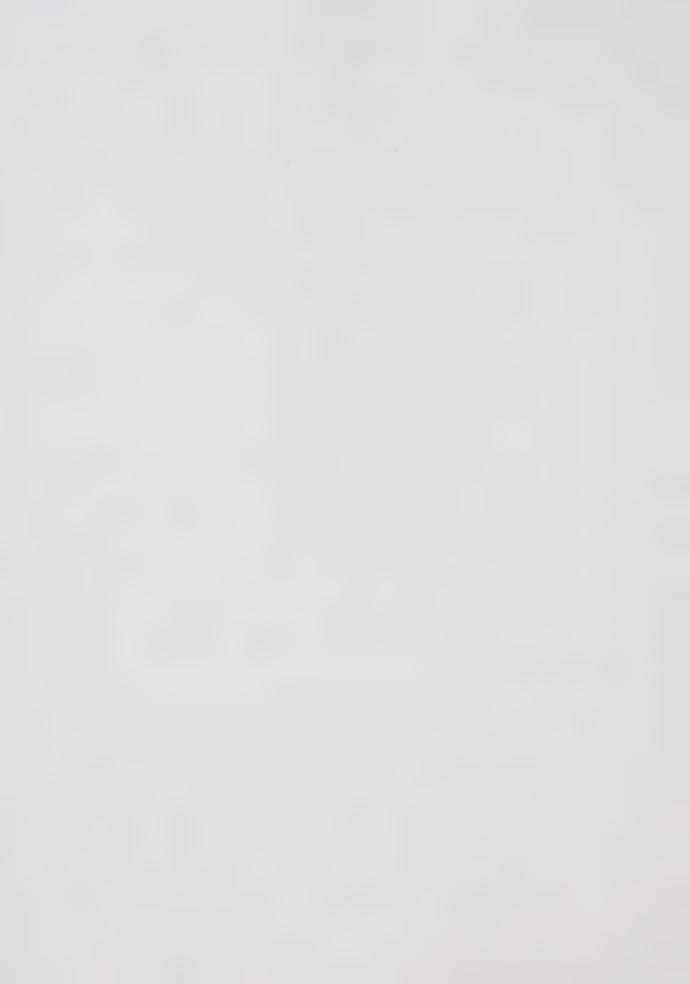
In all provinces and territories, for all years analysed, controlling for diversion increased the traditional juvenile to adult offender ratio. Once again, Saskatchewan (275%-329%) and Ontario (137%-156%) experienced the largest ratio increases as the result of controlling for diversion. On the other hand, Newfoundland, Nova Scotia, New Brunswick, Quebec and Manitoba showed diversion control effects that were in comparison rather minimal.

The Northwest Territories (125%), Alberta (99%), the Yukon Territory (89%) and Prince Edward Island (86%) show relatively large percentage increase ranges as the result of diversion control for property offences. Conversely, New Brunswick (5%) and Quebec (9%) show the most consistent diversion reporting for property offences.

Other Offences

Canada (Table 3, Figure 4.1)

The effect of controlling for diversion for other offences in Canada was an increase in the traditional juvenile to adult offender ratio by between 164% and 223%. Despite the fact that the effect of diversion has been increasing since a low in 1975, the diversion controlled ratio, like

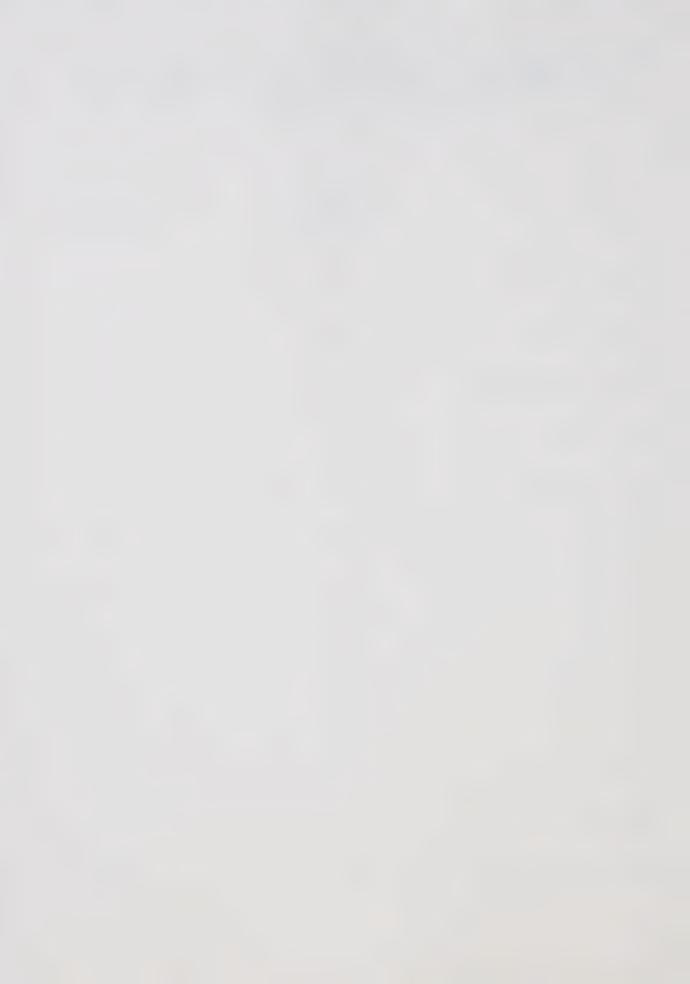


the traditional ratio, shows a general tendency of declining.



TABLE 3
Minimum Percentage Increase and Maximum Percentage Increase in the Traditional Ratio as the Result of Controlling for Diversion for Other Offences for Canada and the Provinces and Territories, 1974-1978

Location	Minimum Percentage Increase	Maximum Percentage Increase
Canada	164	223
Newfoundland	20	107
Prince Edward Island	45	686
Nova Scotia	67	138
New Brunswick	39	129
Quebec	40	94
Ontario	340	420
Manitoba	38	84
Saskatchewan	800	1,200
Alberta	167	329
British Columbia	156	317
Yukon Territory	75	580
Northwest Territories	275	600



Provinces and Territories (Table 3, Figures 4.2-4.13)

The effect of controlling for diversion for other offences is significantly greater in Saskatchewan than in any other province or territory (800%-1200%). Prince Edward Island, Ontario, Alberta, the Yukon Territory and the Northwest Territories display moderate diversion control effects; while Newfoundland, Nova Scotia, New Brunswick, Quebec and Manitoba show relatively low diversion control effects.

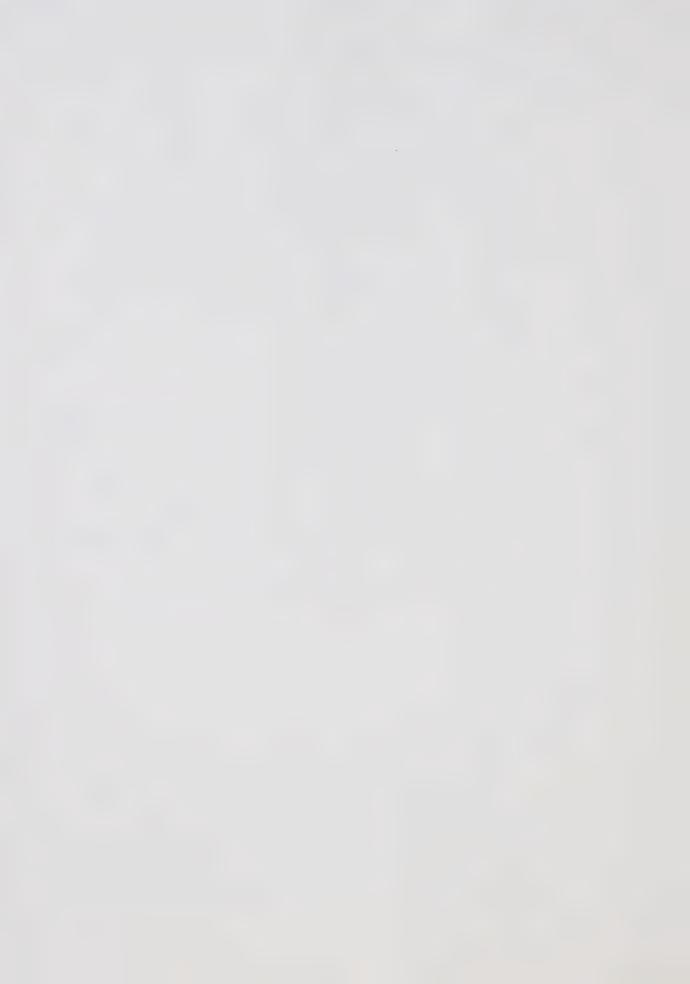
Those provinces and territories which display the least consistent diversion reporting for other offences are Prince Edward Island (641%), the Yukon Territory (505%) and the Northwest Territories (325%). Manitoba (46%), Quebec (54%) and Nova Scotia (71%) have been the most consistent in diversion reporting for other offences.

B. Population

<u>Violent Offences</u>

Canada (Table 4, Figure 2.1)

The ratio of juvenile population to adult population in Canada is decreasing, causing an increase in the population controlled juvenile to adult offender ratio. The inclusion of population

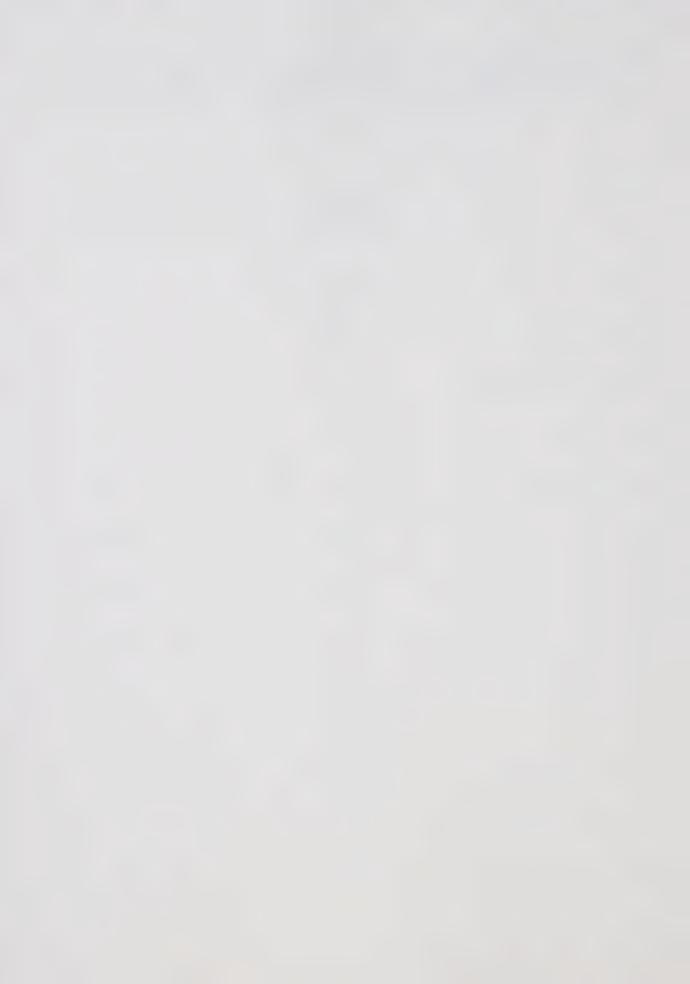


bases increased the offender ratio for violent offences by between 245% and 300% in the years 1974 to 1978. Even though the traditional juvenile to adult offender ratio remained rather stable (.08-.09), the population controlled ratio has increased from .28 to .36, suggesting that the number of juvenile offenders as compared to adult offenders has not declined with the decrease in juvenile population as compared to adult population.



TABLE 4
Minimum Percentage Increase and Maximum Percentage Increase in the Traditional Ratio as the Result of Controlling for Population for Violent Offences for Canada and the Provinces and Territories, 1974-1978

Location	Minimum Percentage Increase	Maximum Percentage Increase
Canada	245	300
Newfoundland	150	186
Prince Edward Island	200	400
Nova Scotia	225	375
New Brunswick	234	325
Quebec	188	269
Ontario	300	367
Manitoba	212	260
Saskatchewan	225	334
Alberta	200	317
British Columbia	286	356
Yukon Territory	240	333
Northwest Territories	133	200



Provinces and Territories (Table 4, Figures 2.2-2.13)

Since the adult population is always greater than the juvenile population, the population controlled juvenile to adult offender ratio is always larger than the traditional juvenile to adult offender ratio. The range of percentage increase in the traditional ratio as the result of controlling for population is 133% (the Northwest Territories, 1974) to 400% (Prince Edward Island, 1976). Thus, controlling for juvenile and adult population at least doubles the traditional juvenile to adult offender ratio for violent offences.

Property Offences

Canada (Table 5, Figure 3.1)

Controlling for population increased the juvenile to adult offender ratio for property offences by between 241% and 321%. However, the population controlled ratio does not itself display any clear pattern of increase or decrease. The slight decrease evident in the traditional ratio is nullified by controlling for population, as the population controlled juvenile to adult offender ratio remains rather stable.

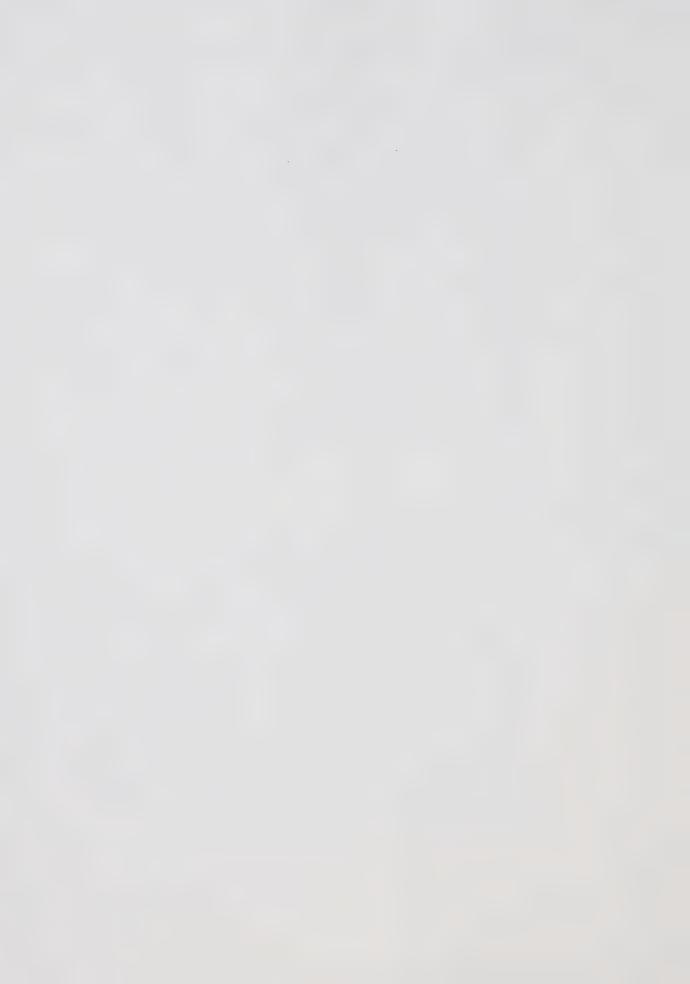
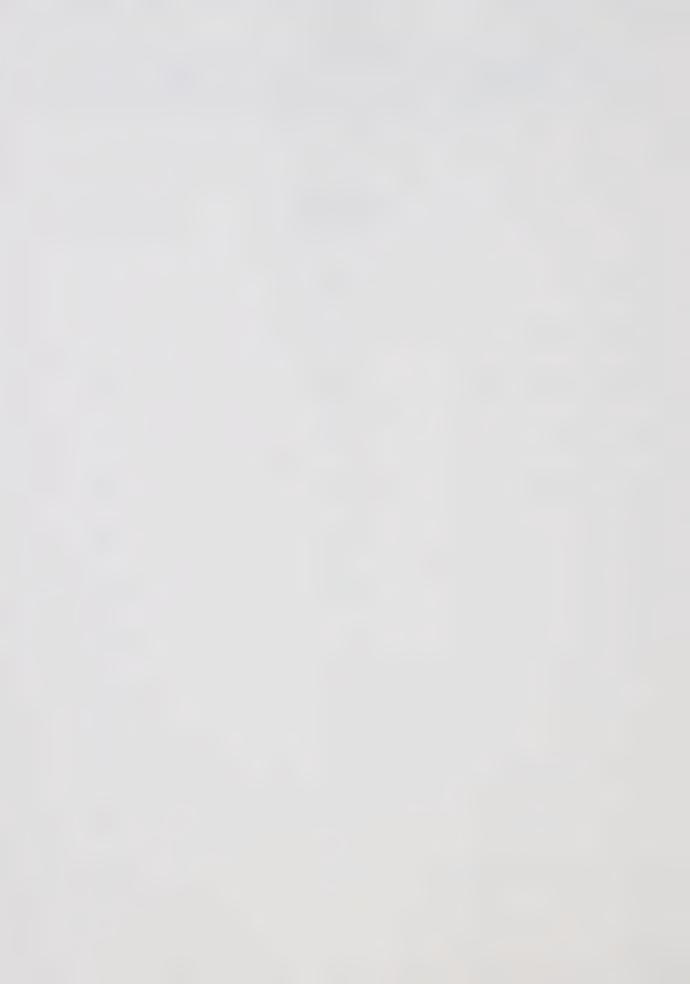


TABLE 5

Minimum Percentage Increase and Maximum Percentage Increase in the Traditional Ratio as the Result of Controlling for Population for Property Offences for Canada and the Provinces and Territories, 1974-1978

Location	Minimum Percentage Increase	Maximum Percentage Increase
Canada	241	321
Newfoundland	145	178
Prince Edward Island	240	297
Nova Scotia	265	344
New Brunswick	242	304
Quebec	193	262
Ontario	304	377
Manitoba	211	253
Saskatchewan	255	344
Alberta	218	342
British Columbia	274	340
Yukon Territory	256	325
Northwest Territories	148	180



Provinces and Territories (Table 5, Figures 3.2-3.13)

Again, since the adult population is always greater than the juvenile population, controlling for population always increases the juvenile to adult offender ratio. The range of increase for property offences was 145% (Newfoundland, 1974) to 344% (Nova Scotia and Saskatchewan, 1978). Here once again, it can be seen that controlling for population at least doubles the traditional juvenile to adult offender ratio.

Other Offences

Canada (Table 6, Figure 4.1)

The effect of controlling for population for other offences in Canada was an increase in the traditional juvenile to adult offender ratio ranging from 246% to 300%. The ratio at least triples as the result of including population. However, even the population controlled juvenile to adult offender ratio displays a slight decreasing tendency.

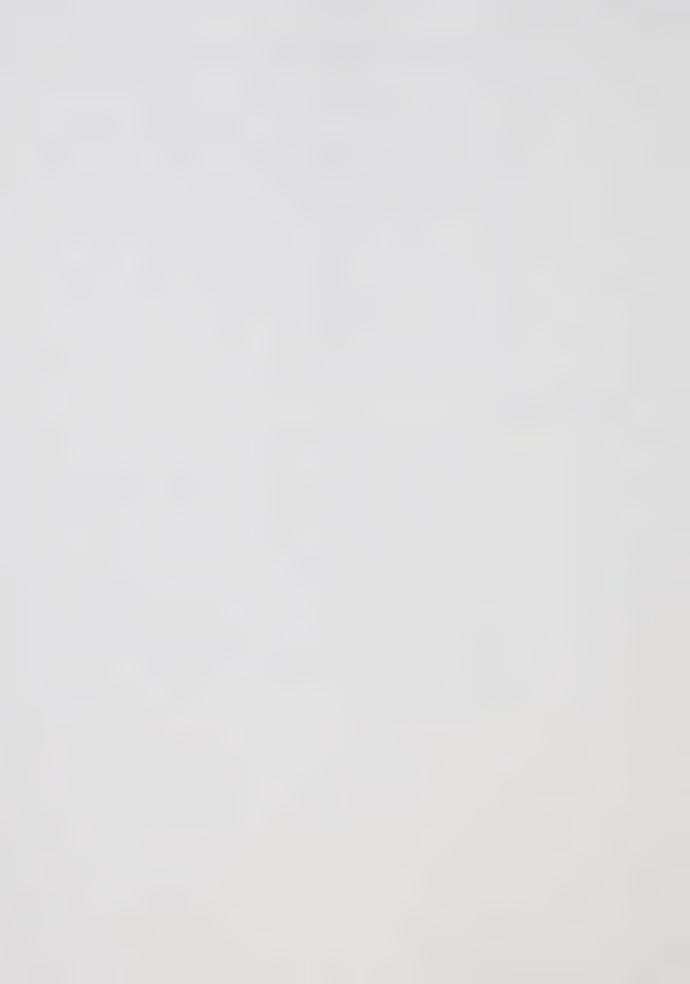
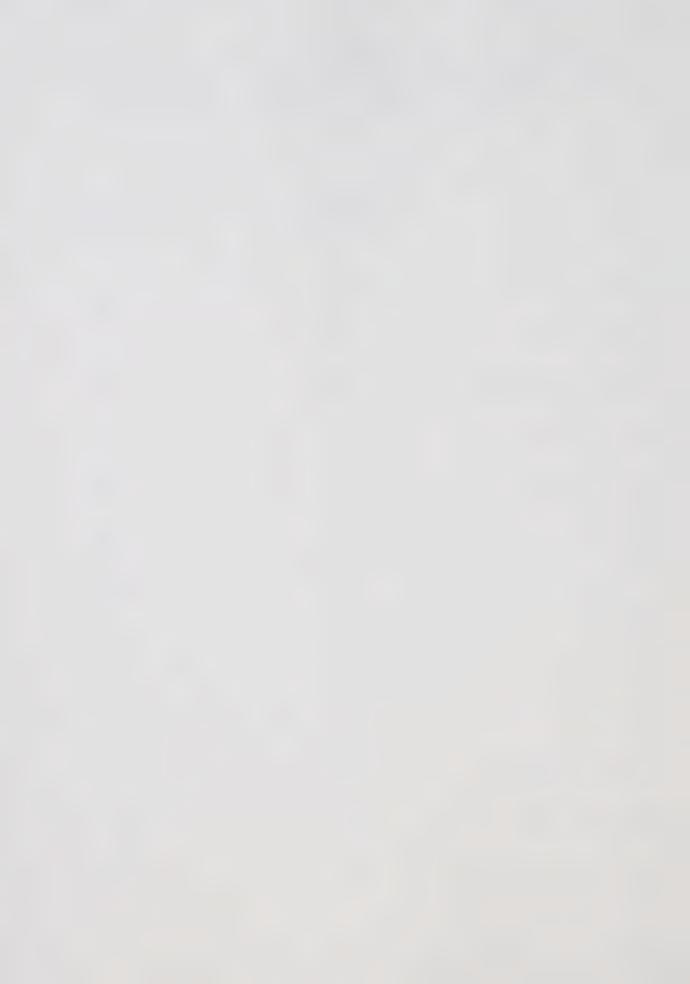


TABLE 6
Minimum Percentage Increase and Maximum Percentage Increase in the Traditional Ratio as the Result of Controlling for Population for Other Offences for Canada and the Provinces and Territories, 1974-1978

Location	Minimum Percentage Increase	Maximum Percentage Increase
Canada	246	300
Newfoundland	147	247
Prince Edward Island	245	300
Nova Scotia	278	340
New Brunswick	239	315
Quebec	187	263
Ontario	300	360
Manitoba	207	252
Saskatchewan	300	450
Alberta	210	315
British Columbia	278	400
Yukon Territory	225	300
Northwest Territories	150	200



Provinces and Territories (Table 6, Figures 4.2-4.13)

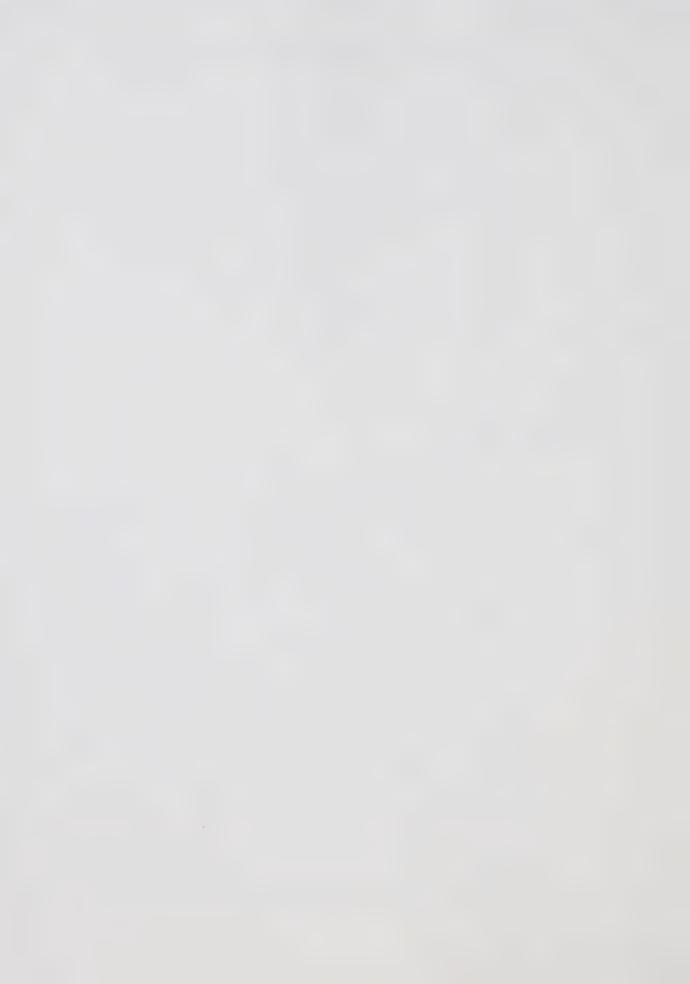
The inclusion of population for provincial and territorial ratios for other offences functions to increase the ratios by between 147% (Newfoundland, 1974) and 450% (Saskatchewan, 1978). As was the case for both violent and property offences, controlling for population always at least doubles the traditional juvenile to adult offender ratio.

C. Diversion and Population

Violent Offences

Canada (Table 7, Figure 2.14)

The effect of controlling for both diversion and population on the juvenile to adult offender ratio is quite significant for violent offences. Whereas the traditional ratio remains below .1, the new ratio reached almost .9 by 1978. The effect of controlling for both diversion and population has been to increase the ratio nine-fold. Moreover, while the traditional ratio remained rather constant during the years analysed, the new ratio has undergone a constant increase. If one were to assume that the increase continued in 1979, a situation would be produced where any given juvenile would be equally as



likely to have been dealt with by the police as any given adult.

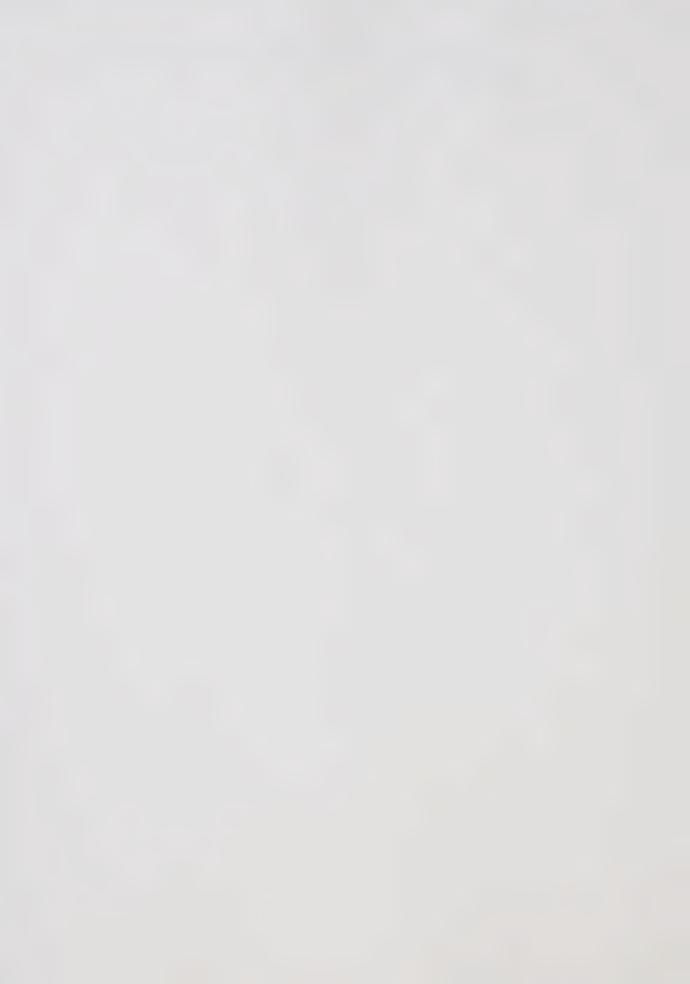
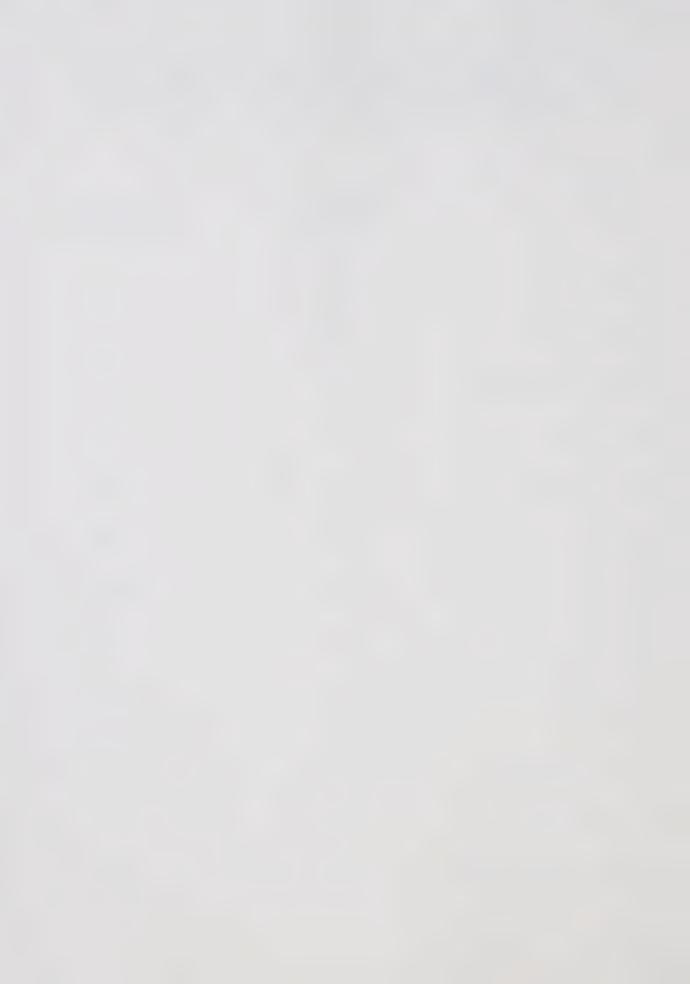


TABLE 7

Minimum Percentage Increase and Maximum Percentage Increase in the Traditional Ratio as the Result of Controlling for Diversion and Population for Violent Offences for Canada and the Provinces and Territories, 1974-1978

Location	Minimum Percentage Increase	Maximum Percentage Increase
Canada	567	889
Newfoundland	184	372
Prince Edward Island	200	4,200
Nova Scotia	434	750
New Brunswick	300	525
Quebec	269	413
Ontario	1,134	1,520
Manitoba	284	384
Saskatchewan	1,000	1,200
Alberta	450	3,250
British Columbia	571	833
Yukon Territory	320	867
Northwest Territories	350	667



Provinces and Territories (Tables 7-8, Figures 2.15-2.26)

By 1978, any given juvenile was more likely than any given adult to have been dealt with by the police for a violent offence in Manitoba, which has a ratio of 1.2, and especially Alberta, where the likelihood is double. Before the ratio rocketed in 1978, Alberta displayed one of the lowest juvenile to adult offender ratios of any province or territory. Besides Manitoba and Alberta, Quebec, Ontario, Saskatchewan and British Columbia display ratios approaching 1.0. On the other hand, Newfoundland, Prince Edward Island, Nova Scotia, New Brunswick and the Northwest Territories typically show ratios of less than .5.

For violent offences, controlling for diversion and population changes Ontario's ranking from 6th to 2nd and Saskatchewan's ranking from 10th to 5th. On the other hand, Newfoundland's ranking falls from 4th to 8th and New Brunswick's ranking goes from 6th to 10th.

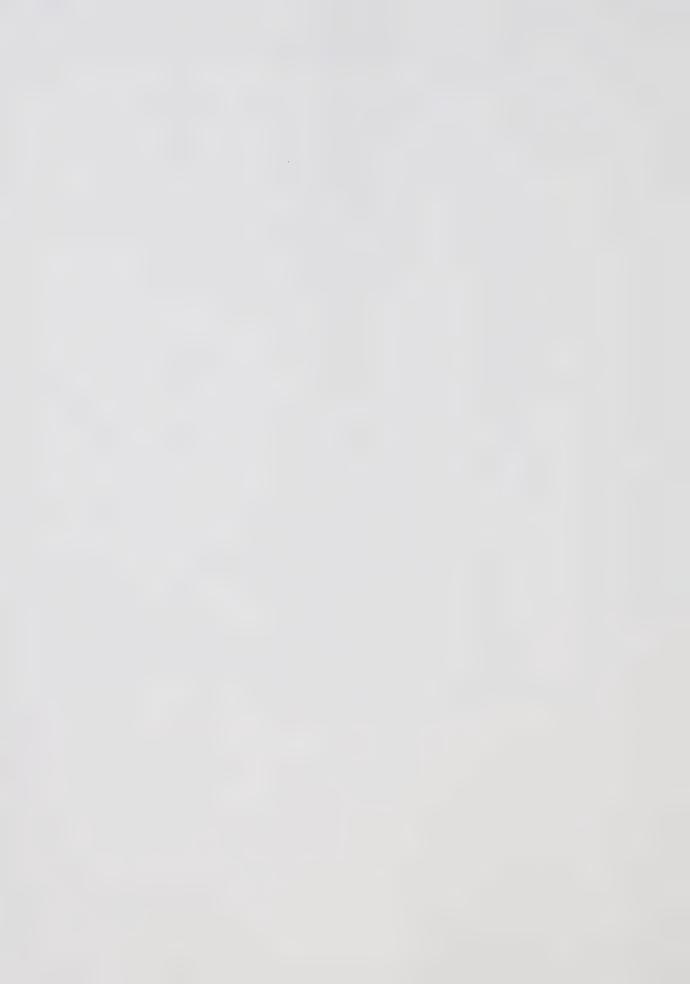


TABLE 8
Median Values and Ranking for Traditional and New Ratios for Violent Offences for the Provinces and Territories, 1974-1978

Location	Traditional Ratio	New Ratio
Newfoundland	.07(4)	.29(8)
Prince Edward Island	.02(12)	. 15 (11)
Nova Scotia	.06(5)	.33(6)
New Brunswick	.05(6)	.24(10)
Quebec	. 17(2)	.74(3)
Ontario	.05(6)	.81(2)
Manitoba	.26(1)	1.14(1)
Saskatchewan	.03(10)	.39(5)
Alberta	.05(6)	.33(6)
British Columbia	.08(3)	.68(4)
Yukon Territory	.05(6)	.29(8)
Northwest Territories	.03(10)	.14(12)



Property Offences

Canada (Table 9, Figure 3.14)

The effect of controlling for both divesion and population for property offences in Canada was an increase in the juvenile to adult offender ratio ranging from 505% in 1975 to 665% in 1978. Whereas the traditional ratio is below .4 and apparently decreasing, the new ratio reached its highest level in 1978 at 2.6. According to this new ratio, juveniles per capita are more than two and a half times as likely as adults per capita to have been dealt with by the police for property offences.

TABLE 9

Minimum Percentage Increase and Maximum Percentage Increase in the Traditional Ratio as the Result of Controlling for Diversion and Population for Property Offences for Canada and the Provinces and Territories, 1974-1978

Location	Minimum Percentage Increase	Maximum Percentage Increase
Canada	505	665
Newfoundland	168	262
Prince Edward Island	297	688
Nova Scotia	347	500
New Brunswick	313	384
Quebec	253	347
Ontario	930	1,062
Manitoba	269	341
Saskatchewan	1,275	1,644
Alberta	431	980
British Columbia	489	736
Yukon Territory	394	793
Northwest Territories	348	686

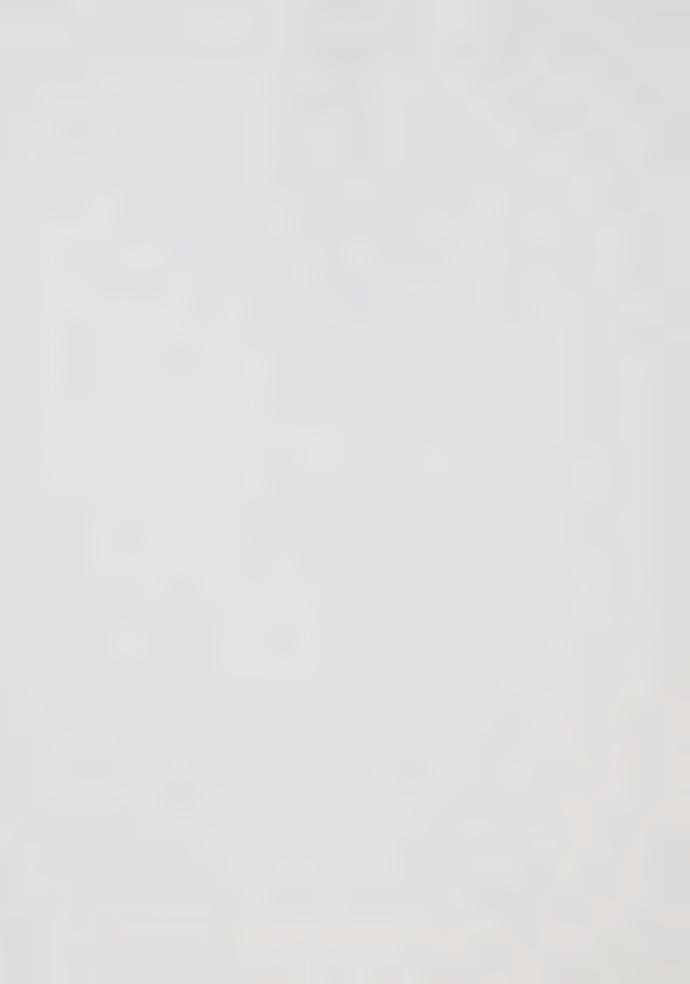


Provinces and Territories (Tables 9-10, Figures 3.15-3.26)

The only point where the data indicate that juveniles per capita were less likely than adults per capita to have been dealt with by the police for property offences was in New Brunswick in 1976. In Quebec, Ontario, Saskatchewan, Alberta and British Columbia, the new ratio consistently surpassed 2.0; and in Manitoba, the ratio always exceeded 4.0, indicating that any given juvenile was over four times as likely as any given adult to have been dealt with by the police for a property offence.

The traditional ratio in Saskatchewan displayed the largest increase when both diversion and population were controlled, increasing 1,275% in 1974 to 1,644% in 1978. Ontario displayed the second greatest effect, increasing from 930% in 1974 to 1,062% in 1978. With the exception of Alberta in 1978 (930%), all other provinces and territories showed increases far below the increases in Saskatchewan and Ontario.

For property offences, the controls change
Ontario's ranking from 11th to 3rd and
Saskatchewan's from 12th to 4th. Thus, according
to the traditional ratio, Ontario and Saskatchewan
displayed the lowest juvenile to adult offender



ratios; but when the controls were included, the ratios for Ontario and Saskatchewan were exceeded only by Manitoba and British Columbia. Conversely, the application of the controls lowered Newfoundland's ranking from 3rd to 9th and Nova Scotia's ranking from 7th to 11th.

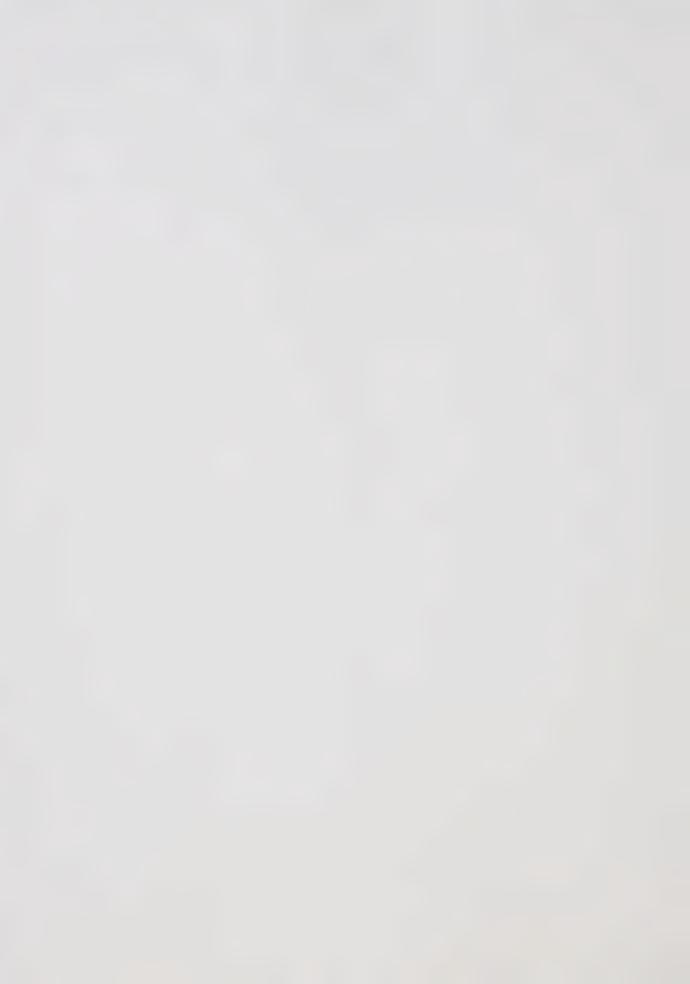
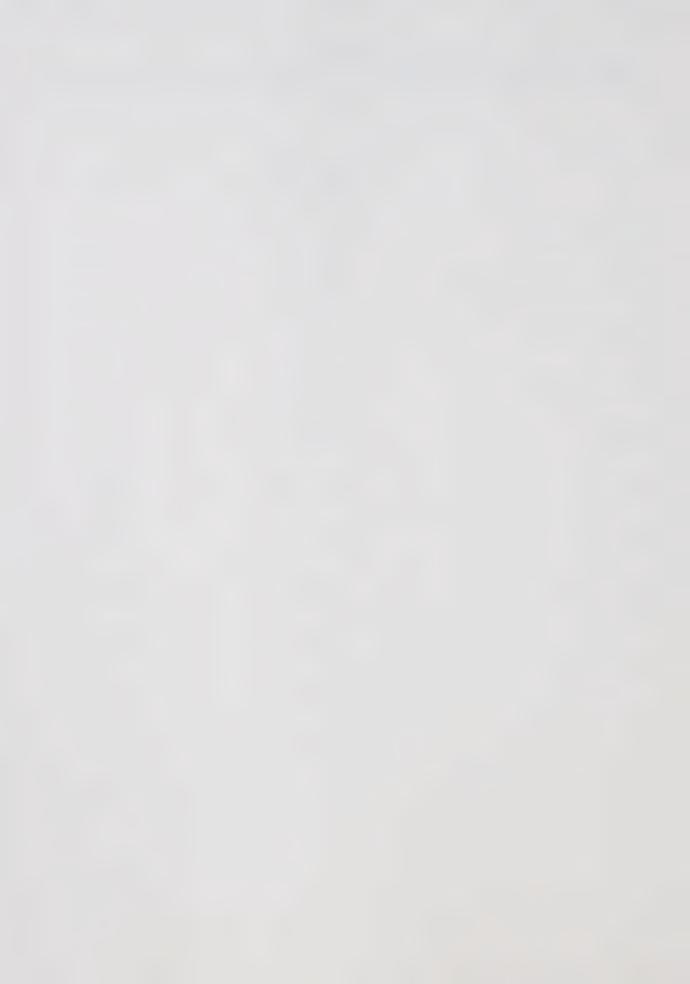


TABLE 10
Median Values and Ranking for Traditional and New Ratios for Property Offences for the Provinces and Territories, 1974-1978

Location	Traditional Ratio	New Ratio
Newfoundland	.52(3)	1.66(9)
Prince Edward Island	.28(9)	2.11(6)
Nova Scotia	.30(7)	1.43(11)
New Brunswick	.27(10)	1.21(12)
Quebec	.58(2)	2.32(5)
Ontario	.24(11)	2.70(3)
Manitoba	1.03(1)	4.24(1)
Saskatchewan	.16(12)	2.57(4)
Alberta	.36(5)	2.09(7)
British Columbia	.46(4)	3.42(2)
Yukon Territory	.33(6)	1.84(8)
Northwest Territories	.29(8)	1.65(10)



Other Offences

Canada (Table 11, Figure 4.14)

Controlling for both diversion and population in assessing the offender ratio for other offences in Canada increased the ratio by an incredible degree ranging from 855% to 1,256%. In addition, the new ratio shows an increasing tendency, whereas the traditional ratio displays a decreasing tendency. Therefore, where the traditional ratio suggested that the probability of juveniles per capita being dealt with by the police for other offences was about one-tenth that of adults per capita and decreasing, the new ratio suggests that juveniles per capita are more likely than adults per capita to be dealt with by the police, and that the ratio is actually increasing.

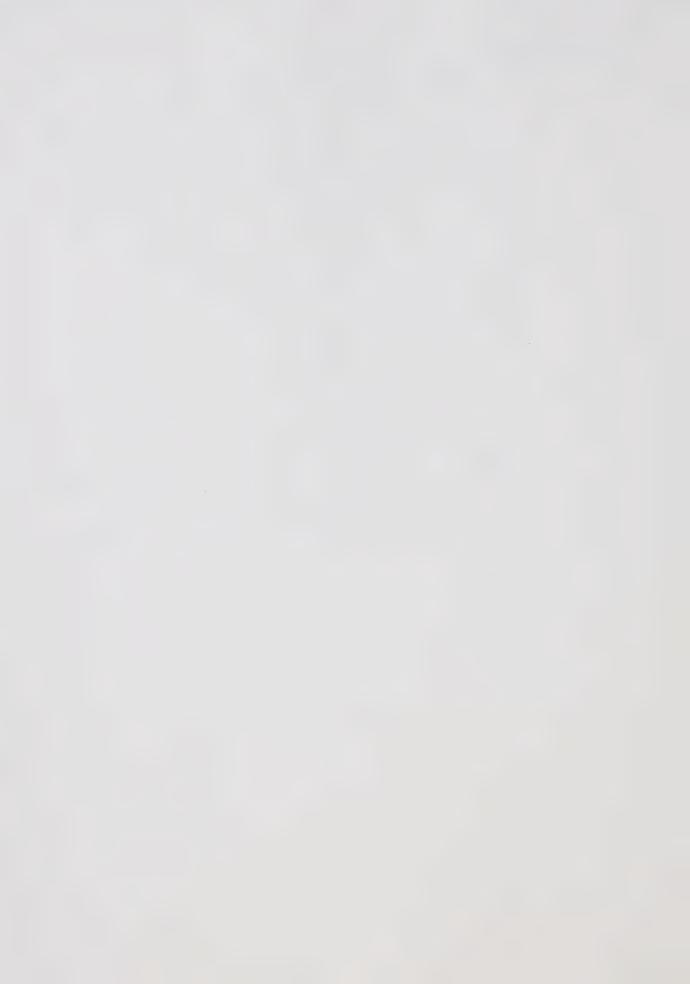
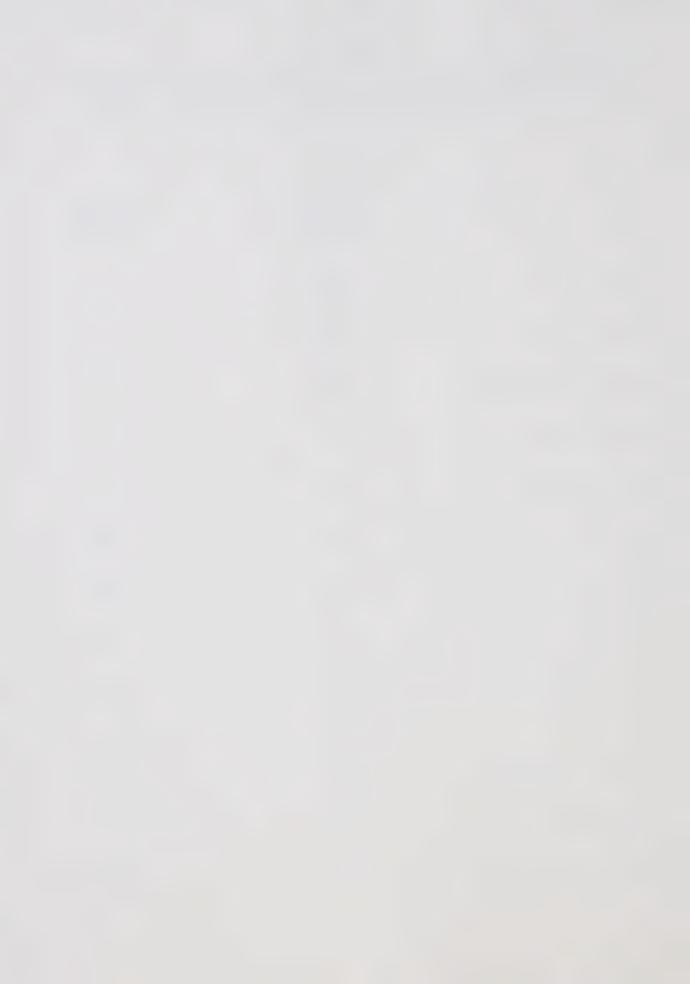


TABLE 11

Minimum Percentage Increase and Maximum Percentage Increase in the Traditional Ratio as the Result of Controlling for Diversion and Population for Other Offences for Canada and the Provinces and Territories, 1974-1978

Location	Minimum Percentage Increase	Maximum Percentage Increase
Canada	855	1,256
Newfoundland	200	454
Prince Edward Island	400	3,000
Nova Scotia	612	830
New Brunswick	393	815
Quebec	332	594
Ontario	1,934	2,340
Manitoba	343	472
Saskatchewan	3,734	5,550
Alberta	812	1,800
British Columbia	867	1,633
Yukon Territory	525	2,800
Northwest Territories	900	1,600



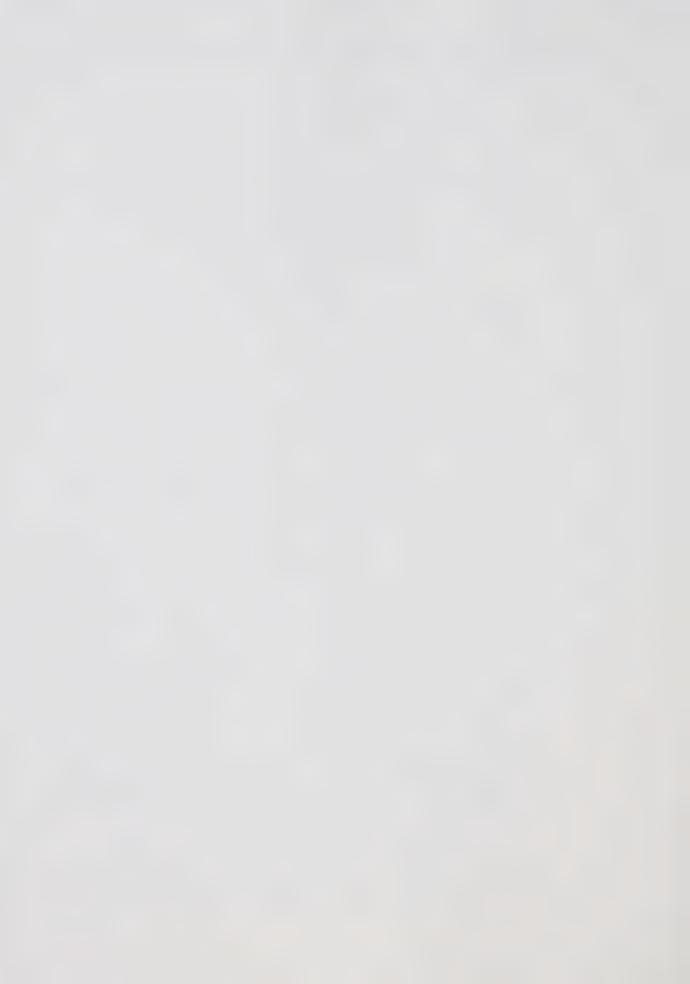
Provinces and Territories (Tables 11-12, Figures 4.15-4.26)

The Canadian increase in the new ratio for other offences is reflected in the data for Newfoundland, Saskatchewan, British Columbia, the Yukon Territory and the Northwest Territories, which all display increasing ratios.

The combined control effect is especially evident for Saskatchewan (3,734%-5,550%) and to a lesser extent for Ontario, Prince Edward Island, Alberta, British Columbia, the Yukon Territory and the Northwest Territories. Conversely, the effect of controlling for diversion and population is quite low for Newfoundland, Quebec and Manitoba.

Prince Edward Island, Quebec, Ontario,
Manitoba and British Columbia consistently display
ratios of over 1.0, indicating that juveniles per
capita are more likely than adults per capita to
be dealt with by the police for other offences.

For other offences, the rankings increased as the result of the application of the controls for Prince Edward Island (8th to 3rd), Ontario (9th to 4th) and Saskatchewan (12th to 7th). The ranking changed in the opposite direction for Newfoundland (3rd to 8th) and New Brunswick (5th to 10th). British Columbia, which ranked 4th according to the traditional ratio, displayed the highest



juvenile to adult offender ratio for other offences after diversion and population controls were introduced.

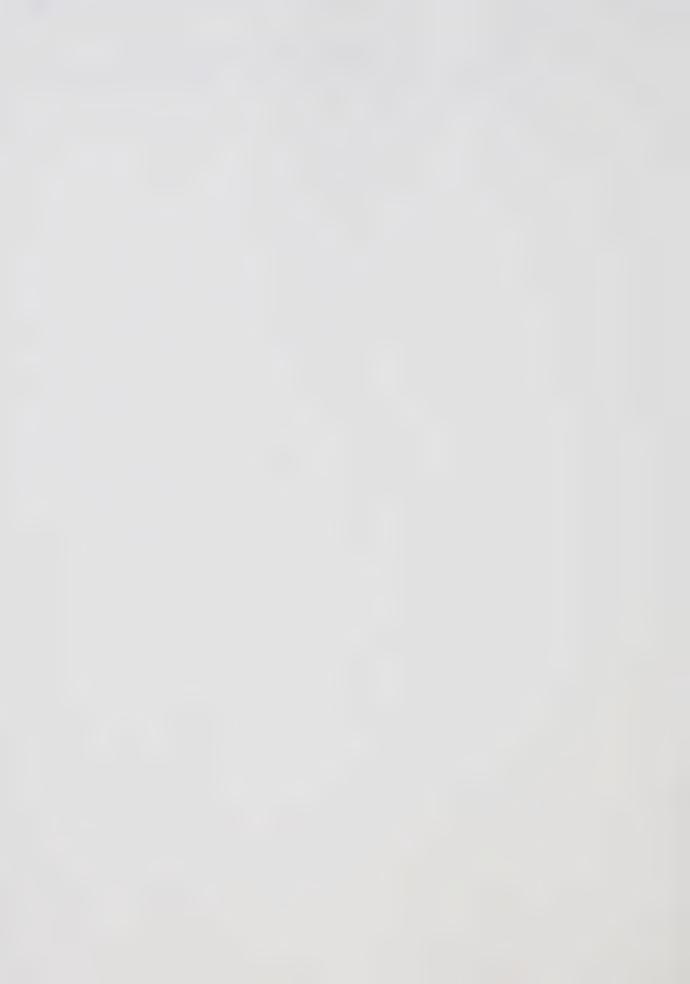
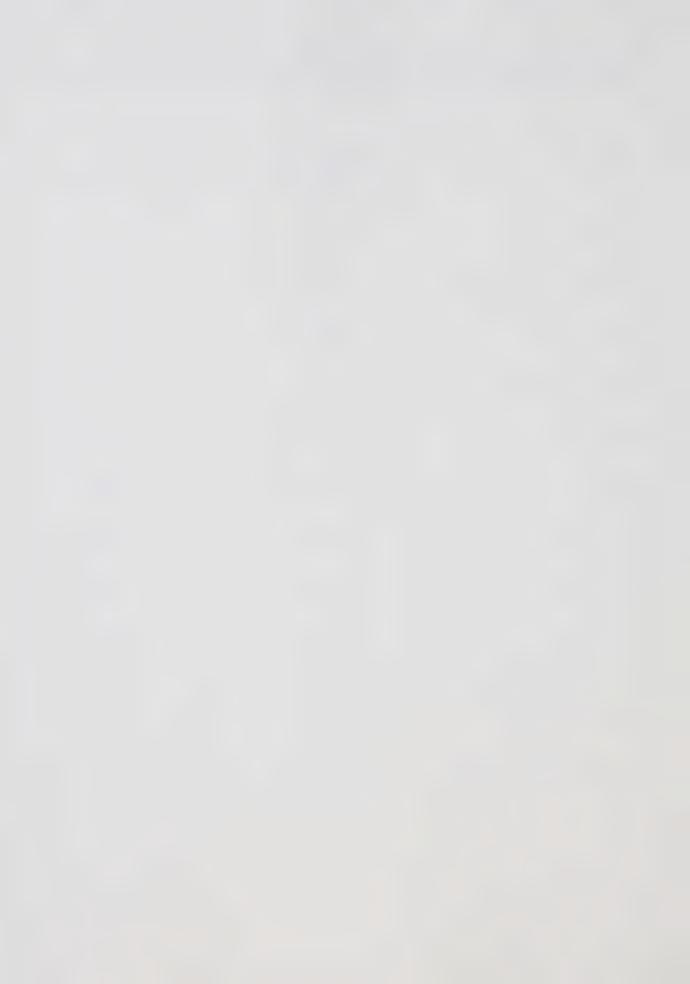


TABLE 12 Median Values and Ranking for Traditional and New Ratios for Other Offences for the Provinces and Territories, 1974-1978

Location	Traditional Ratio	New Ratio
Newfoundland	.19(3)	.78(8)
Prince Edward Island	.08(8)	1.40(3)
Nova Scotia	.09(6)	.70(9)
New Brunswick	. 10(5)	.64(10)
Quebec	.22(2)	1.08(5)
Ontario	.05(9)	1.22(4)
Manitoba	.32(1)	1.73(2)
Saskatchewan	.02(12)	.87(7)
Alberta	.09(6)	1.02(6)
British Columbia	. 12(4)	1.84(1)
Yukon Territory	.05(9)	.41(11)
Northwest Territories	.03(11)	.35(12)



D. Summary

Diversion

In Canada, controlling for diversion proved to be most significant for other offences, followed by violent offences and property offences. This means that the ratio of juveniles not charged to juveniles charged was greatest for other offences. Ignoring wild fluctuations, the pattern of the highest level of diversion occurring in other offences held for all provinces and territories. Only Saskatchewan and the Northwest Territories diverted more for property offences than violent offences.

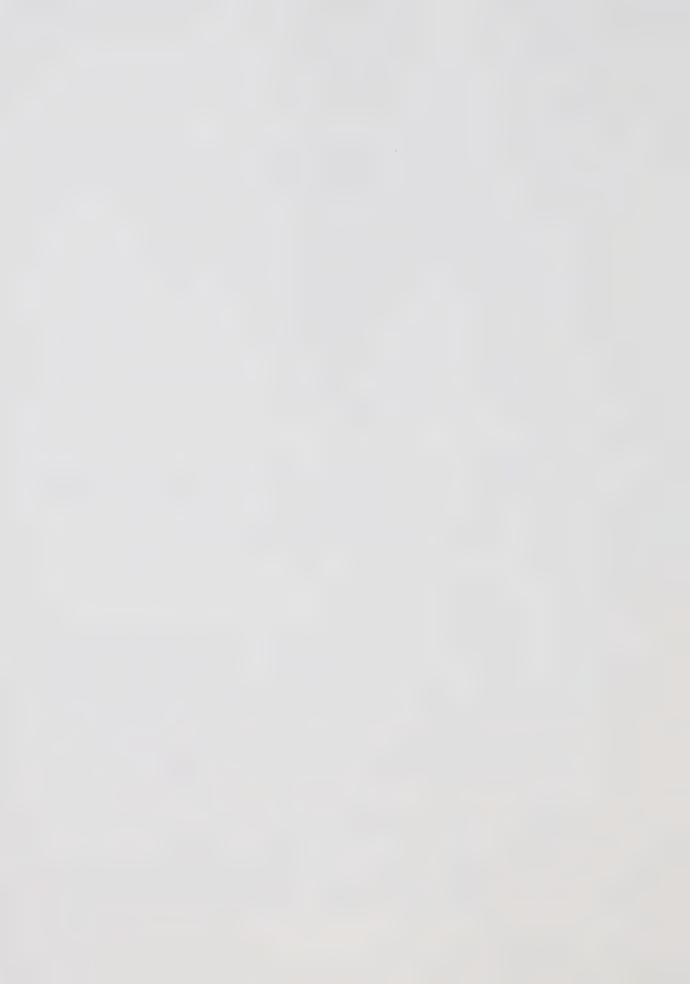
Population

Increases due to population control were understandably fairly uniform for all offence types in Canada. This uniformity was also reflected in all provinces and territories.

<u>Diversion</u> and <u>Population</u>

Controlling for diversion and population functioned to increase the ratio for other offences to the greatest degree in Canada and all provinces and territories. Other offences were followed by violent offences and property offences, with the exceptions of Saskatchewan and the Northwest Territories.

In general, for all offence types, the act of controlling for both diversion and population increased the rankings for Prince Edward Island, Ontario and Saskatchewan.

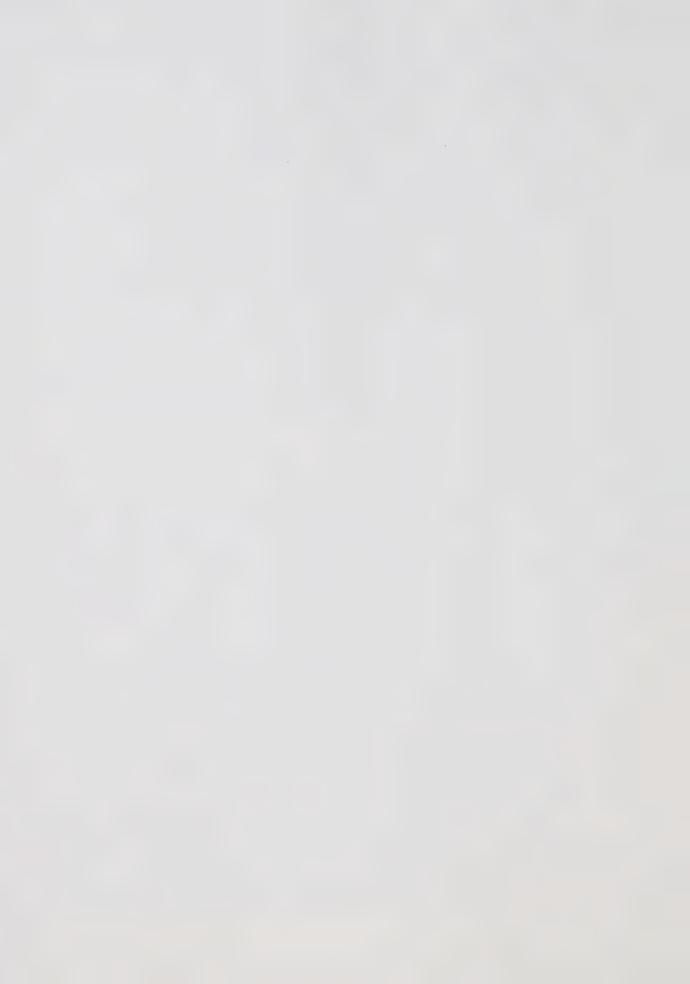


On the other hand, this same controlling exercise decreased the rankings for Newfoundland, Nova Scotia, New Brunswick, Quebec, the Yukon Territory and the Northwest Territories. No clear general pattern could be identified for Manitoba, Alberta and British Columbia.

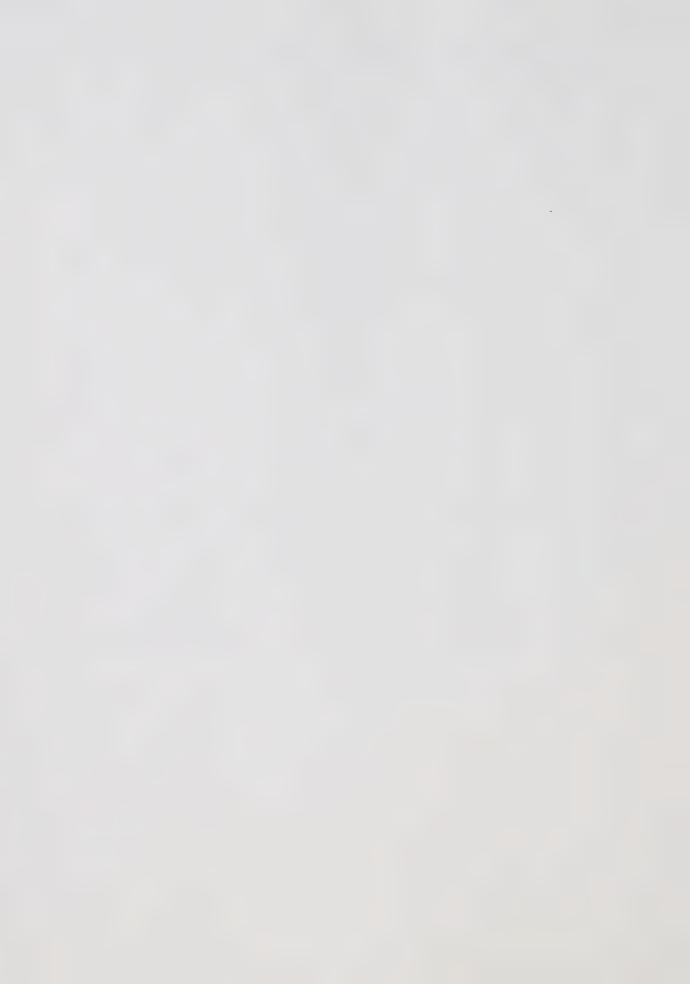
In general, Manitoba displays the highest juvenile to adult offender ratio for violent offences and property offences, and places a close second to British Columbia for other offences. These high ratios for Manitoba occur despite low diversion in that province. Therefore, not only does Manitoba report a high degree of juveniles dealt with by the police, but also these juveniles are, for the most part, charged and not diverted.

Other provinces which report a relatively high ratio of juveniles per capita dealt with by the police to adults per capita dealt with by the police for all offence types in general are British Columbia, Ontario, Quebec, Saskatchewan and Alberta. Those reporting comparatively low ratios are the Northwest Territories, New Brunswick, the Yukon Territory, Nova Scotia, Newfoundland and Prince Edward Island. Thus, according to the official data, juveniles are dealt with by the police to a greater degree in central Canada and western Canada, and to a lesser degree in the Maritimes and the Territories.

In addition, it appears as though juvenile involvement vis-a-vis adult involvement is highest for property offences, followed by other offences, and lastly, violent



offences. Generally speaking, in Canada, juveniles per capita are more than twice as likely as adults per capita to be dealt with by the police for property offences; juveniles per capita are more likely than adults per capita to be dealt with by the police for other offences; and juveniles per capita are less likely than adults per capita to be dealt with by the police for violent offences. Even though by 1978 juveniles were less likely than adults to be dealt with by the police for violent offences, the ratio shows definite evidence of increasing, so that guite probably by the present time, juveniles could be equally as likely or even more likely than adults to be dealt with by the police for violent offences. This would create a situation where, regardless of offence type, any given juvenile is more likely than any given adult to be dealt with by the police. However, if the traditional ratio were to have been used, juveniles would appear to be one-tenth as likely as adults to be dealt with by the police for violent and other offences, and one-third to one-half for property crimes.



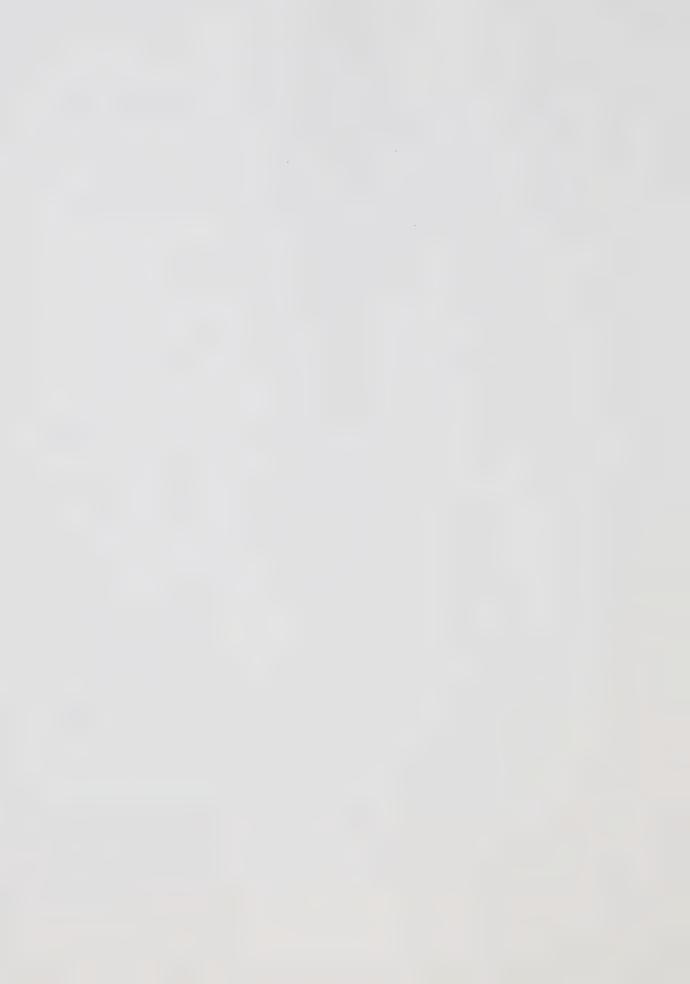
V. Conclusion

The research project consisted of devising a strategy for making a crude and somewhat incorrect measure of juvenile to adult crime volume more sophisticated and more correct. This was accomplished by means of standardizing the measure by controlling for diversion and population.

From the data analysis, it can be seen that both diversion and population controls make significant differences in the juvenile to adult offender ratio. The pattern of the population control is quite uniform, while the pattern of diversion control varies depending on the offence type and the reporting aggregate being investigated.

The overall result of standardizing the measure suggests that juvenile involvement with the criminal justice system is far greater than would otherwise be suspected. The juvenile involvement per capita in violent offences was almost as much as adult involvement per capita by 1978.

Moreover, this violent offence juvenile to adult ratio was increasing rapidly. The probability of a juvenile being reported as a property crime offender was over twice that of an adult. Any given juvenile was more likely than any given adult to have been dealt with by the police for other offences. As a whole, the official data indicate that the police in Canada deal with significantly more juveniles per capita than adults per capita. All these findings ultimately prompt one to ask the question: Are juveniles really getting worse?

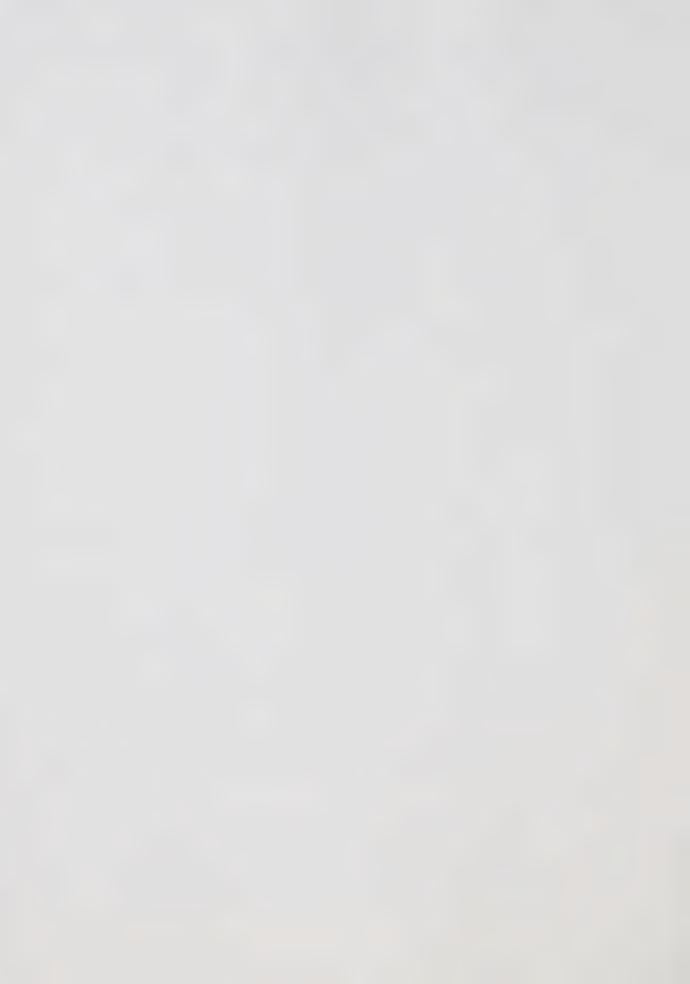


Unfortunately, a definitive answer to such a question does not fall within the scope of this research. The question as to whether the official data accurately reflect the true crime situation cannot be answered here, nor perhaps, anywhere else.

However, given the assumption that official data represent the closest approximation actual crime volume which is available, a number of speculations and suggestions can be put forth to aid in interpretation.

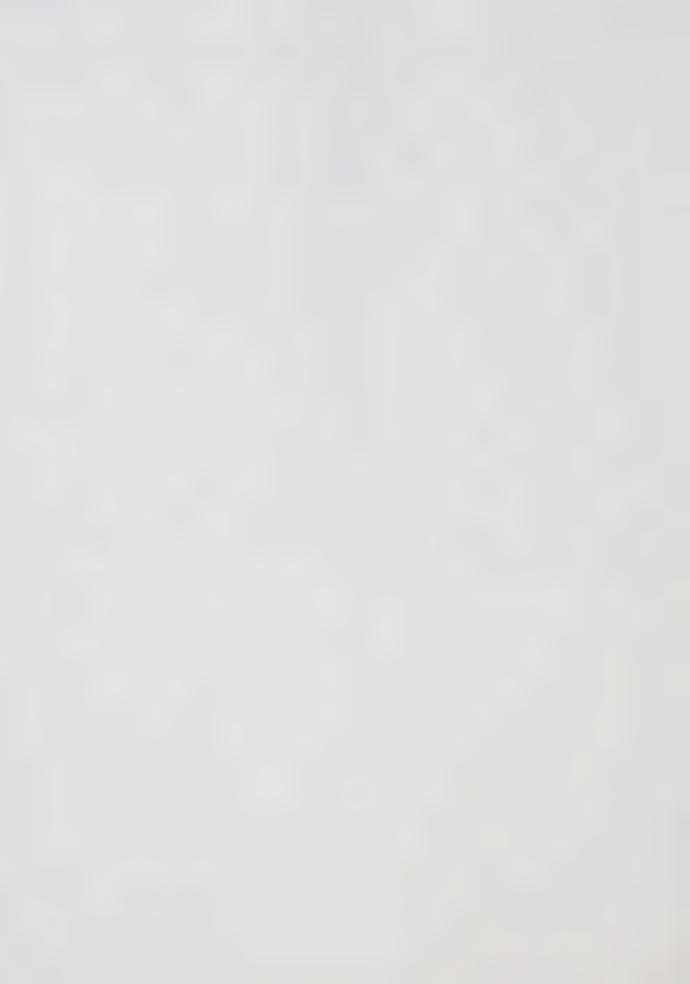
The findings may be the result of more thorough record keeping by the police which is one facet of a general increase in the professionalization of police work. Also, because the police are attaining more freedom in the way they can deal with juveniles (such as diverting or not charging), more juveniles get officially counted. On the other hand, the data were analysed from 1974, which was when diverted or not charged juveniles were first officially counted. Manitoba consistently reported one of the highest juvenile to adult offender ratios among the provinces and territories, despite comparatively low diversion. Further research could perhaps clear up some of these apparent inconsistencies. A more detailed study of how certain police forces record their dealings with juveniles could shed light on these issues.

The situation appears to be one where a tremendous amount of inconsistency exists concerning the handling and/or recording of juvenile offenders by the police.



Whether these inconsistencies accurately reflect provincial directives or different methods of interpreting the uniform crime reporting rules concerning juveniles should be the subject of further, more detailed investigation. Until such a project is undertaken, any measure of juvenile crime volume must remain suspect.

Any further study in this area should begin with an investigation into the existence of provincial directives concerning the handling of juvenile offenders. From there, the investigation should proceed to the individual contributor level. Since there are thousands of individual reporting units country-wide, such a study would undoubtedly require some sort of sampling exercise. Reporting units could be given a series of hypothetical cases to code and the analysis of the results would give an indication of the degree of uniformity that exists concerning the reporting of juvenile offenders.



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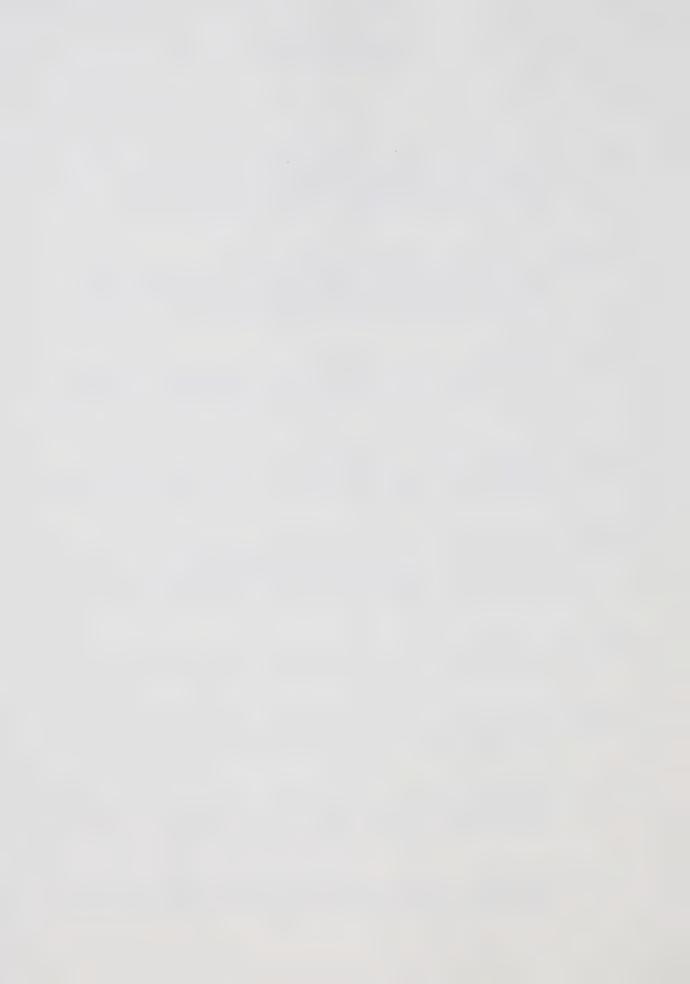
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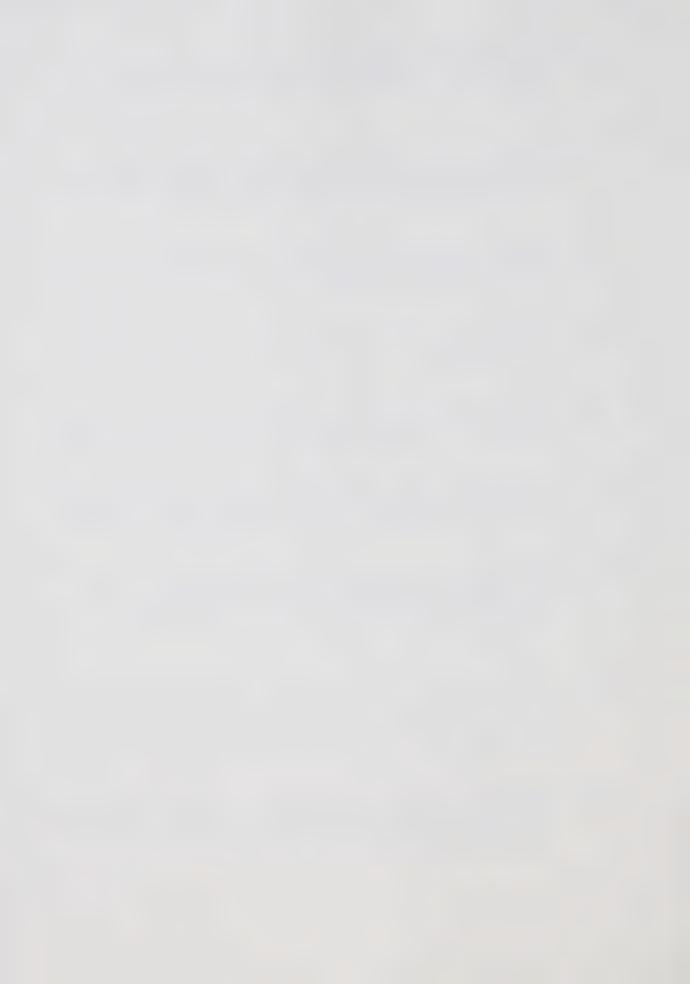
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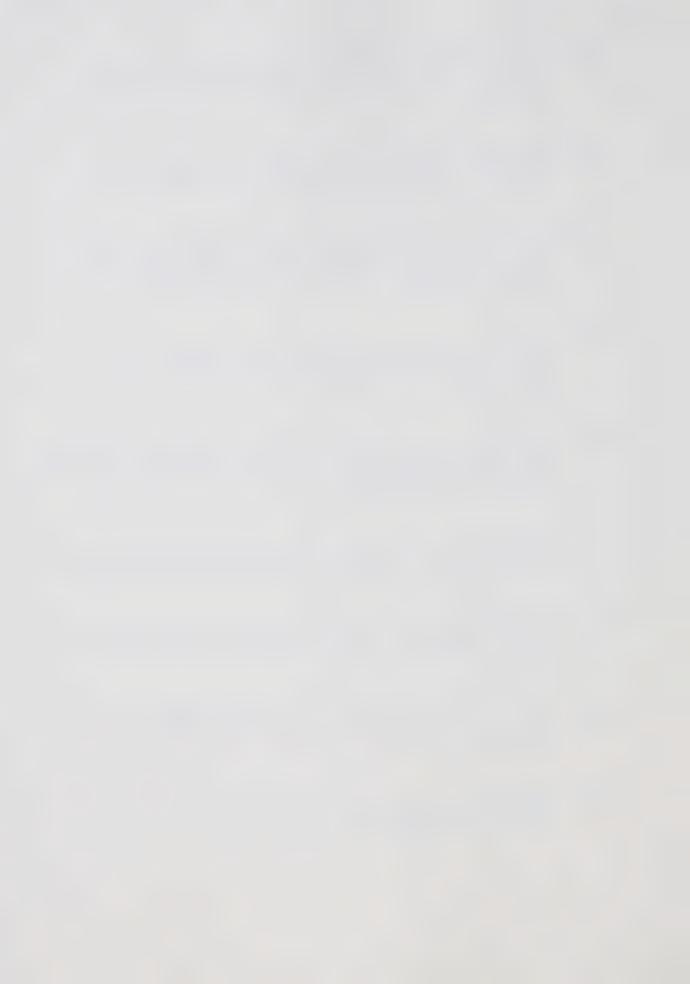
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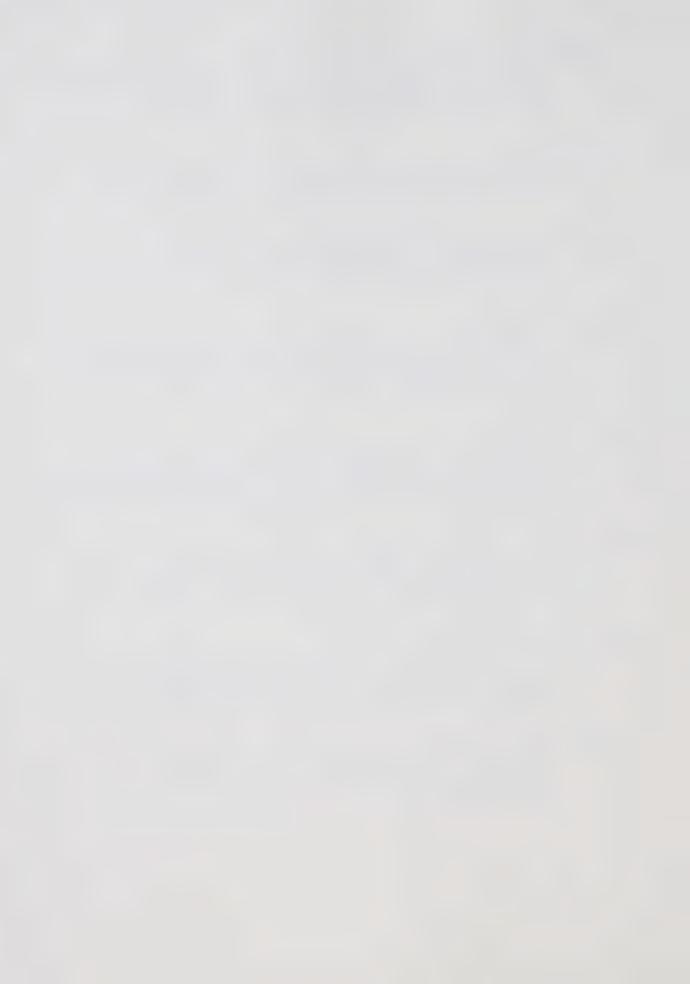
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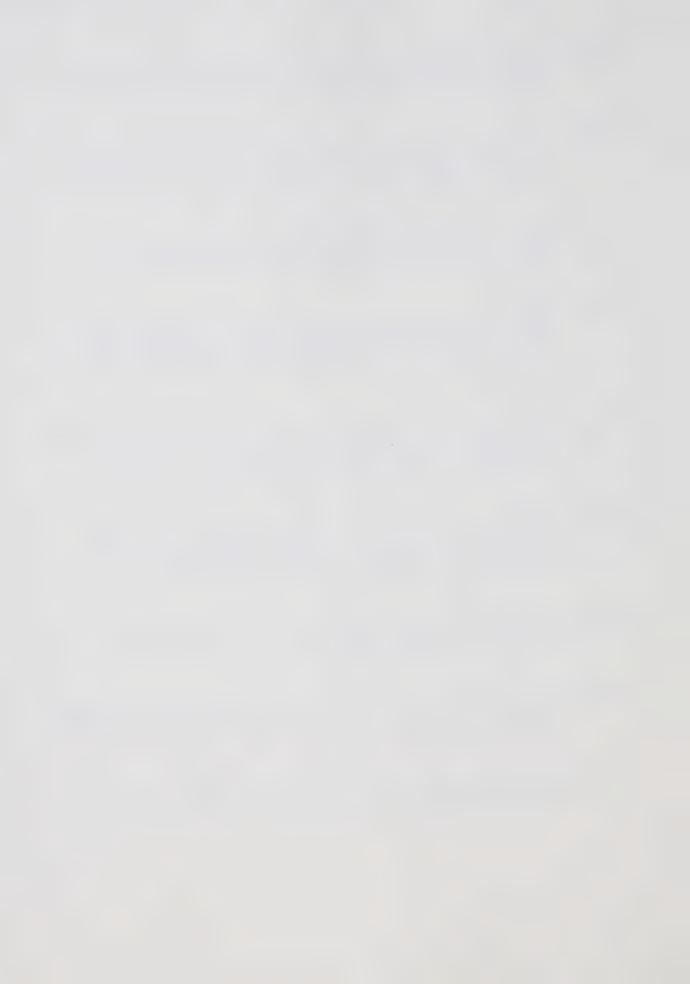
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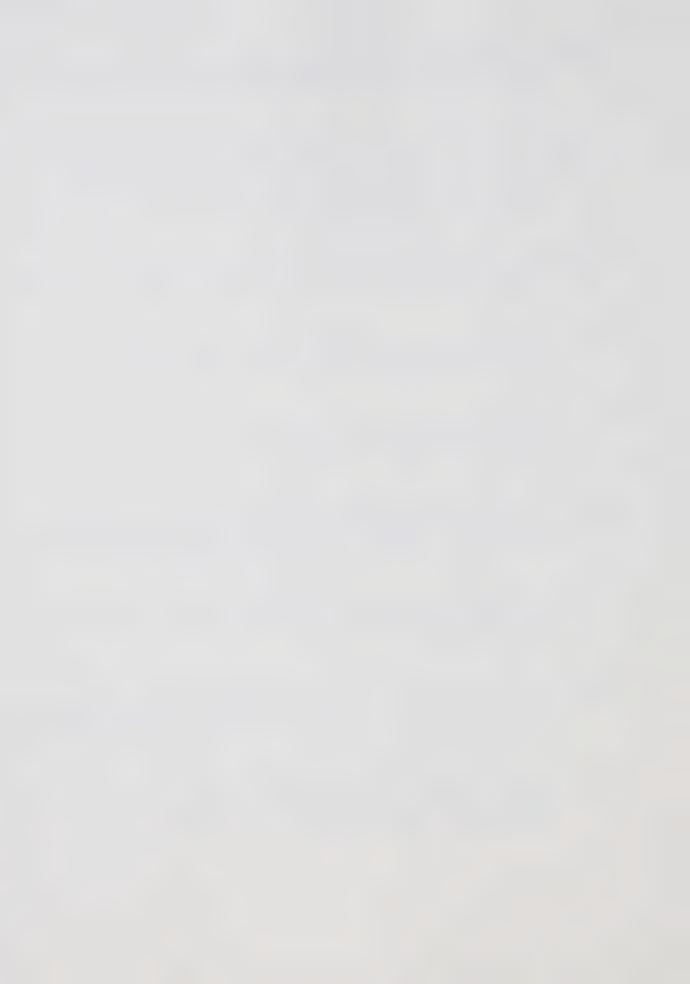
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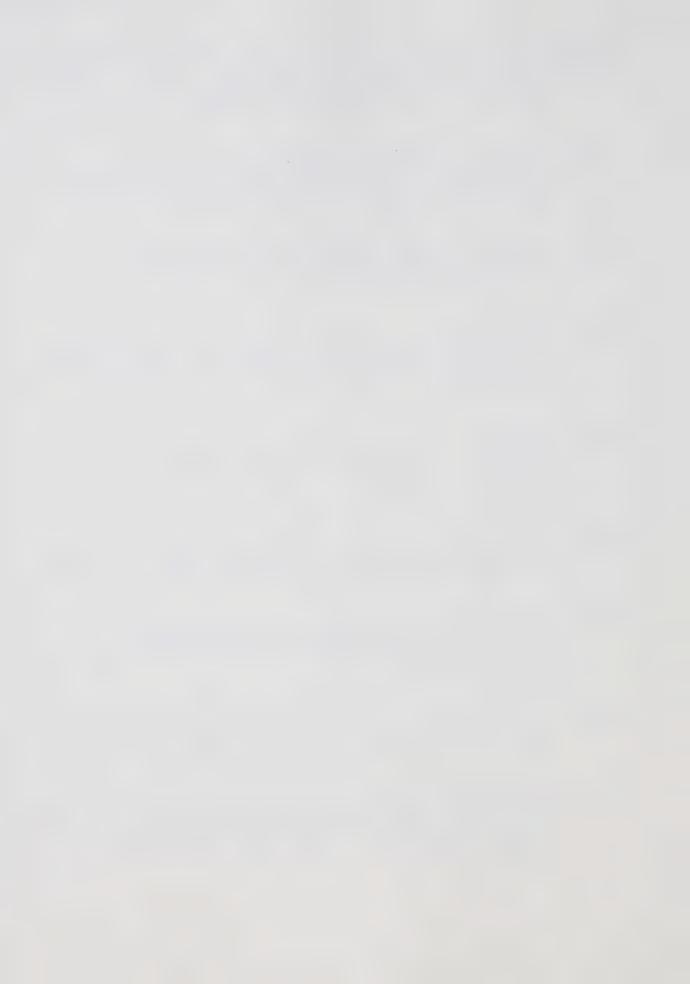
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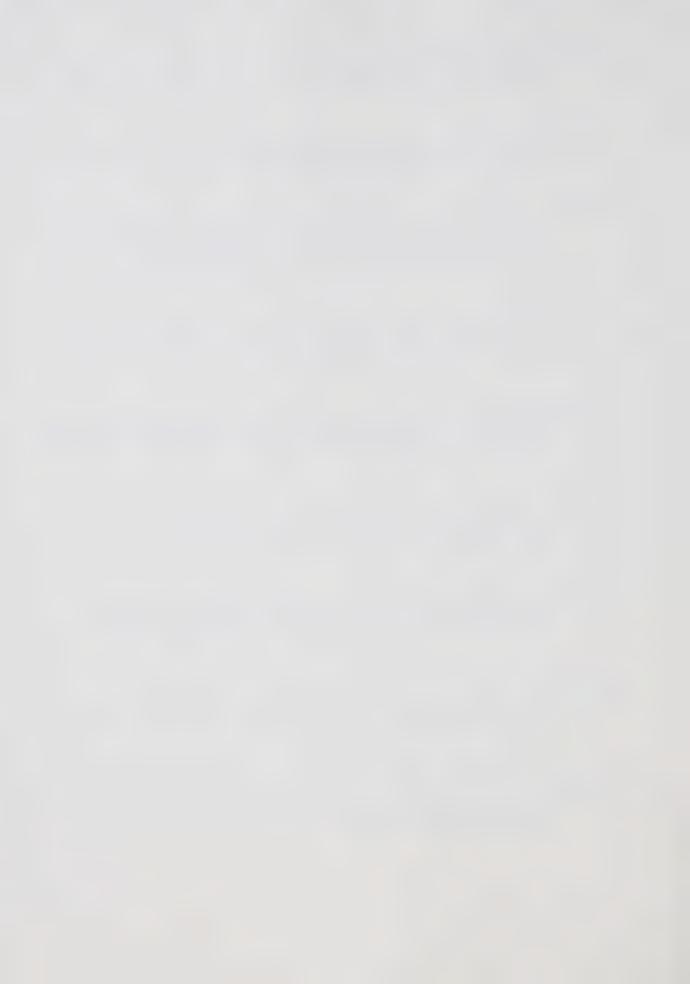
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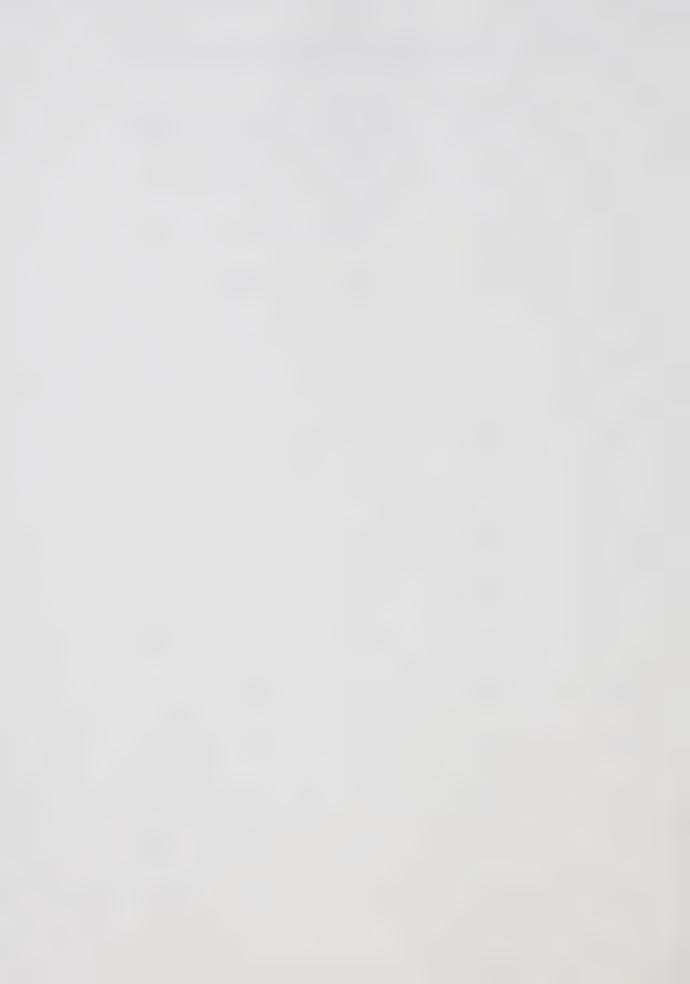
Appendix 1

Ratio Values



Juvenile to Adult Offender Ratios by Offence Type for Canada, 1974-1978

	Traditional Ratio	Diversion Controlled Ratio	Population Controlled Ratio	New Ratio
Violence 1974	.08	. 16	. 28	.57
1975	.09	. 17	.31	.60
1976	.09	. 17	. 32	.65
1977	.09	. 18	. 36	.72
1978	.09	. 21	.36	.89
Property 1974	. 42	.75	, 1.43	2.58
1975	. 42	.70	1.50	2.54
1976	.38	.66	1.43	2.47
1977	. 37	.62	1.44	2.44
1978	.34	.62	1.43	2.60
Other 1974	.11	. 32	.38	1.11
1975	.11	.29	.38	1.05
1976	. 10	. 29	. 37	1.09
1977	.09	. 27	. 35	1.08
1978	.09	.29	. 36	1.22



Juvenile to Adult Offender Ratios by Offence Type for Newfoundland, 1974-1978

	Traditional Ratio	Diversion Controlled Ratio		New Ratio
Violence 1974	.06	.07	. 15	. 17
1975	.08	. 11	. 21	. 27
1976	.09	.11	.23	.29
1977	.07	. 11	. 19	.31
1978	.07	. 12	.20	.33
Property 1974	.52	.57	1.27	1.41
1975	.62	.67	1.54	1.66
1976	.63	.70	1.65	1.83
1977	. 49	.66	1.33	1.77
1978	. 49	. 59	1.36	1.65
Other 1974	. 17	.24	. 42	.59
1975	. 26	.31	.65	.78
1976	. 19	.29	.50	.74
1977	. 15	.31	. 42	.83
1978	. 19	.31	.53	.87



Juvenile to Adult Offender Ratios by Offence Type for Prince Edward Island, 1974-1978

	Traditional Ratio	Diversion Controlled Ratio	Population Controlled Ratio	New Ratio
Violence 1974	.02	.02	.06	.06
1975	.03	.04	.09	. 15
1976	. 0 1	. 12	. 05	.43
1977	.01	.03	.03	. 13
1978	.04	.13	. 15	.51
Property 1974	. 28	. 33	.95	1.11
1975	. 46	.60	1.63	2.11
1976	.24	. 43	.89	1.60
1977	. 32	.65	1.25	2.52
1978	. 28	.53	1.11	2.14
Other 1974	.03	. 05	. 11	. 15
1975	.09	.13	.31	. 47
1976	.08	. 41	.31	1.50
1977	.07	.55	.28	2.17
1978	. 10	.35	. 40	1.40



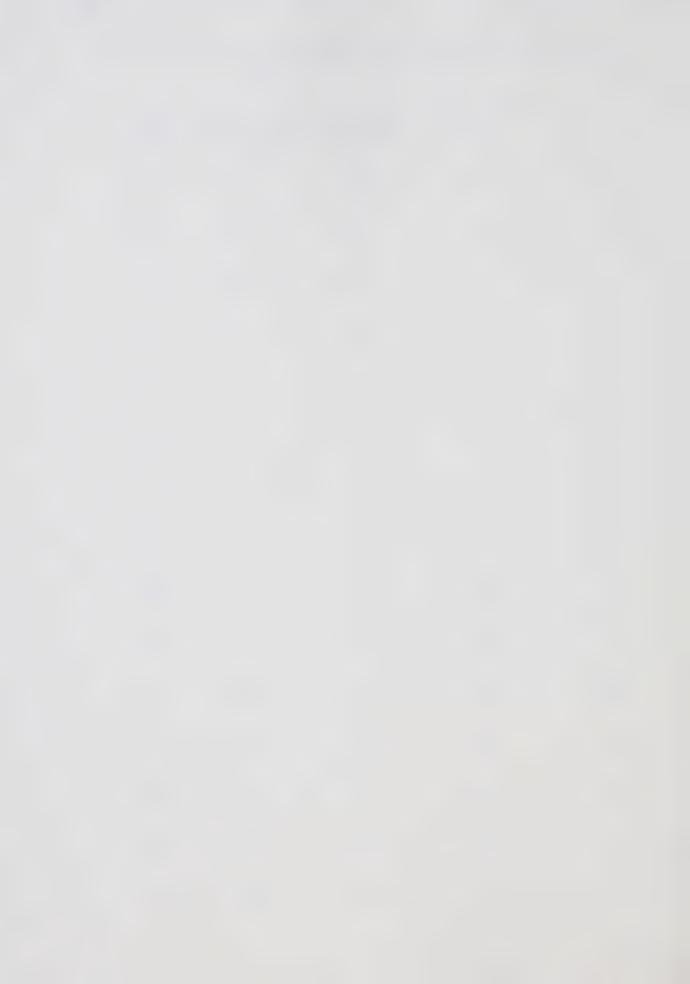
Juvenile to Adult Offender Ratios by Offence Type for Nova Scotia, 1974-1978

	Traditional Ratio		Population Controlled Ratio	New Ratio
Violence 1974	.04	.06	. 13	.22
1975	.06	.08	. 24	. 32
1976	.06	.08	. 26	.33
1977	.06	. 10	. 25	.43
1978	.04	.08	. 19	.34
Property 1974	.31	. 39	1.13	1.42
1975	. 32	.37	1.23	1.43
1976	.28	. 32	1.12	1.27
1977	.30	.39	1.26	1.61
1978	. 25	.33	1.11	1.45
Other 1974	.09	. 19	. 34	.70
1975	.09	. 15	.35	.57
1976	.09	. 16	.36	.64
1977	. 10	.22	. 44	.93
1978	.08	. 19	. 34	.82



Juvenile to Adult Offender Ratios by Offence Type for New Brunswick, 1974-1978

	Traditional Ratio	Diversion Controlled Ratio		New Ratio
Violence 1974	.06	.07	.20	.24
1975	. 04	.07	. 16	.25
1976	. 07	.08	. 26	.30
1977	.04	.06	. 17	.24
1978	.05	.06	.20	.23
Property 1974	.31	.37	1.06	1.28
1975	.31	. 37	1.10	1.31
1976	.20	.23	.76	.86
1977	.27	. 31	1.07	1.20
1978	.25	.30	1.01	1.21
Other 1974	. 13	.18	. 44	.64
1975	. 11	.20	.39	.70
1976	. 10	. 16	. 37	.58
1977	.09	. 16	.34	.63
1978	.07	.16	.29	.64



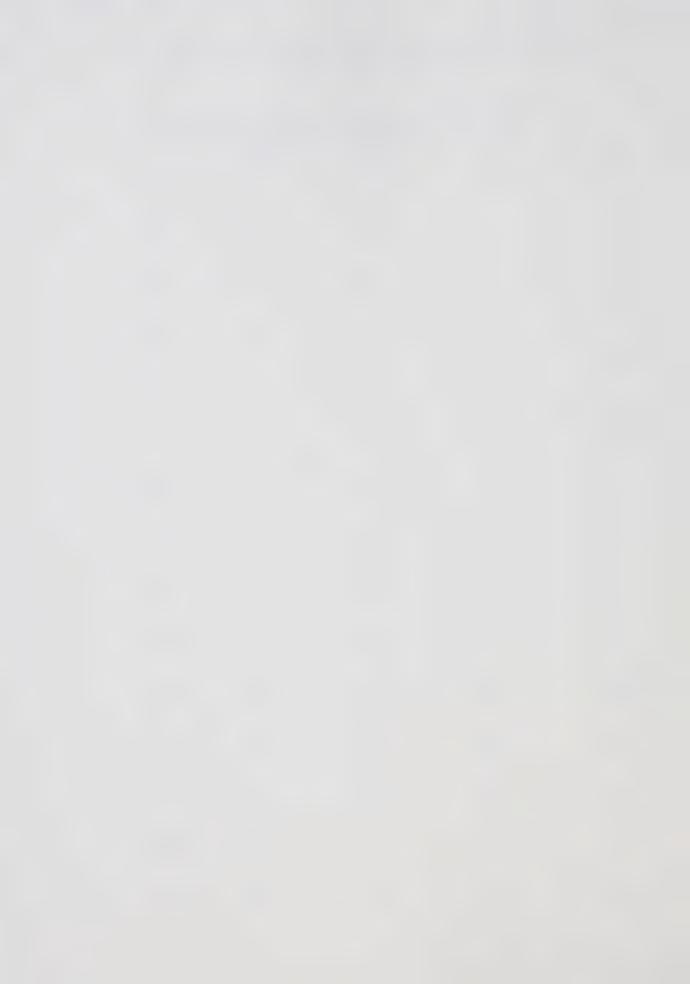
Juvenile to Adult Offender Ratios by Offence Type for Quebec, 1974-1978

	Traditional Ratio		Population Controlled Ratio	New Ratio
Violence 1974	. 16	.20	. 46	.59
1975	. 19	.24	.59	.73
1976	. 17	.23	.55	. 74
1977	.20	.26	.67	.90
1978	. 16	. 23	.59	.82
Property 1974	.57	.70	1.67	2.04
1975	.66	.76	2.03	2.33
1976	.59	.69	1.90	2.23
1977	.58	.70	1.98	2.37
1978	.52	.65	1.88	2.32
Other 1974	.22	. 34	.63	.98
1975	. 25	. 35	.75	1.08
1976	. 22	. 36	.70	1.17
1977	. 18	.30	.60	1.02
1978	. 16	.31	.58	1.11



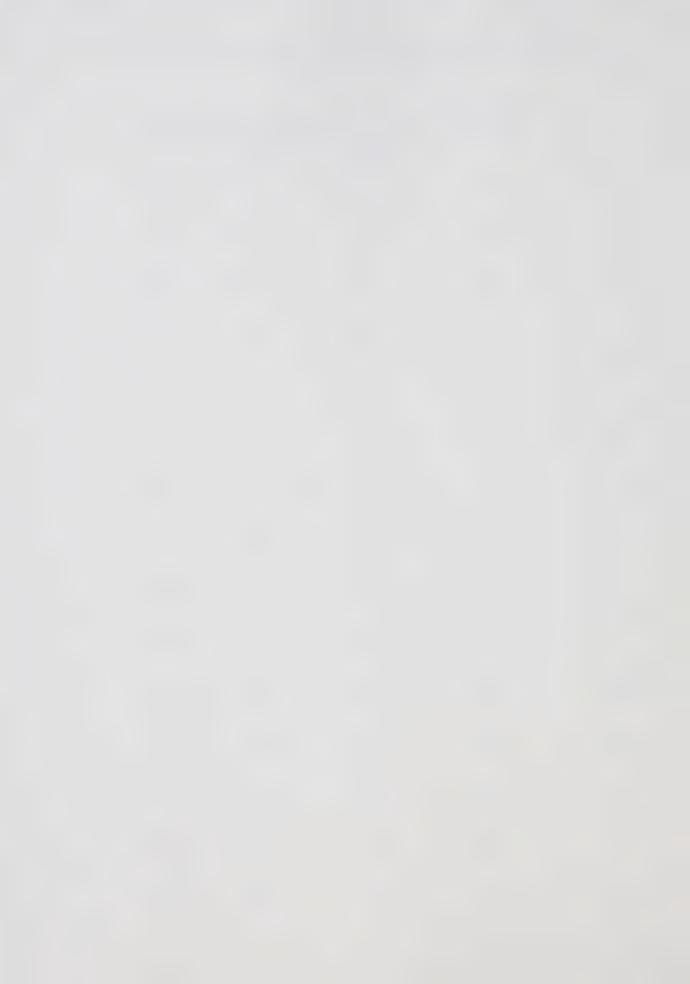
Juvenile to Adult Offender Ratios by Offence Type for Ontario, 1974-1978

	Traditional Ratio	Diversion Controlled Ratio	Population Controlled Ratio	New Ratio
Violence 1974	.05	.19	.21	.77
1975	.05	. 17	.20	.73
1976	.05	. 18	. 23	.81
1977	.06	. 19	. 26	.86
1978	.06	. 19	.28	.89
Property 1974	.30	.76	1.21	3.09
1975	.27	.69	1.15	2.90
1976	.24	.61	1.06	2.70
1977	.22	.52	1.02	2.39
1978	.21	.51	1.00	2.44
Other 1974	.07	. 36	.28	1.45
1975	.06	.29	. 24	1.22
1976	.05	. 26	.23	1.14
1977	.05	.22	.22	1.03
1978	.05	.25	.22	1.22



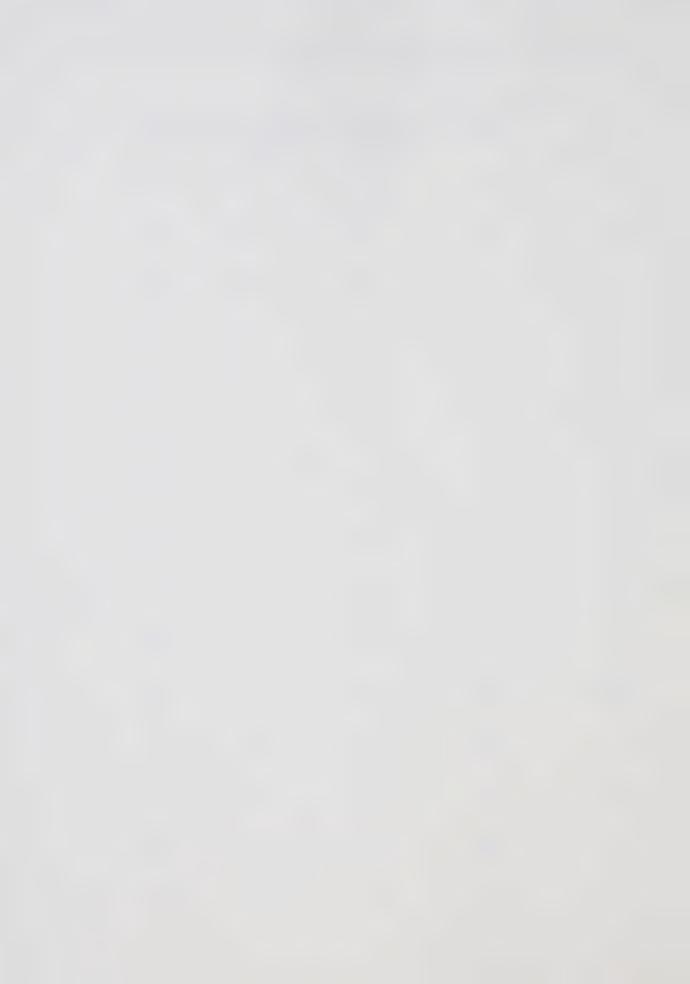
Juvenile to Adult Offender Ratios by Offence Type for Manitoba, 1974-1978

	Traditional Ratio		Population Controlled Ratio	New Ratio
Violence 1974	. 27	. 37	.84	1.14
1975	. 30	. 36	. 95	1.15
1976	. 26	.31	.88	1.03
1977	. 25	.33	.86	1.11
1978	. 25	. 34	.90	1.21
Property 1974	1.12	1.59	3.48	4.94
1975	1.15	1.32	3.69	4.24
1976	.99	1.21	3.30	4.01
1977	1.03	1.25	3.51	4.29
1978	.94	1.13	3.31	4.00
Other 1974	. 31	. 57	.95	1.77
1975	.40	.55	1.29	1.77
1976	. 33	. 49	1.09	1.62
1977	.32	.51	1.10	1.73
1978	.31	. 46	1.09	1.62



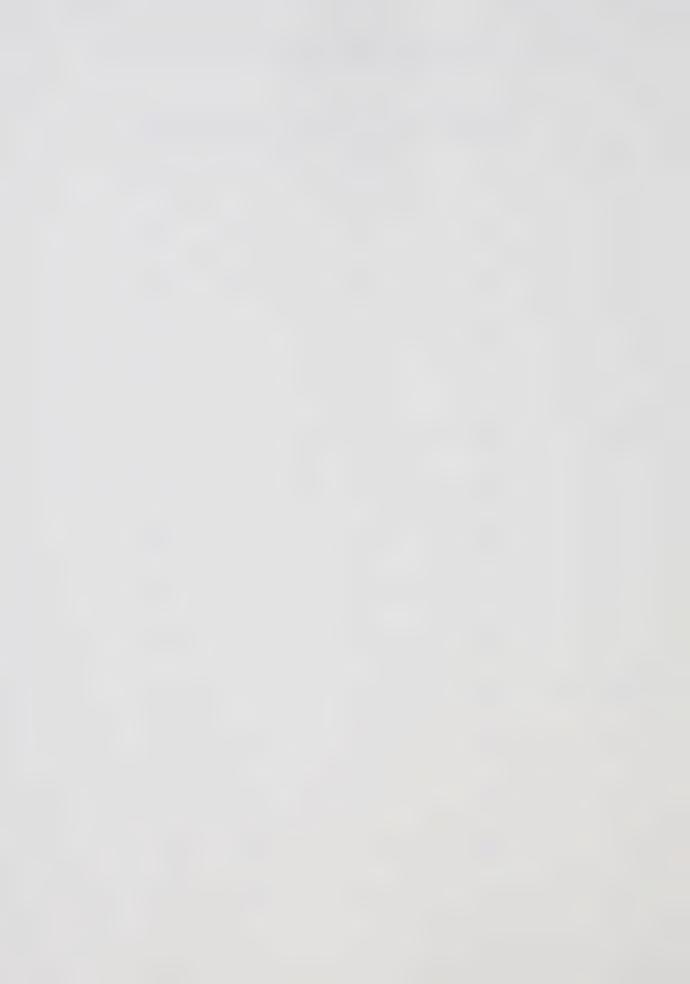
Juvenile to Adult Offender Ratios by Offence Type for Saskatchewan, 1974-1978

	Traditional Ratio	Diversion Controlled Ratio	Population Controlled Ratio	New Ratio
Violence 1974	.04	.13	. 15	. 46
1975	.04	.12	. 13	. 44
1976	.03	. 10	. 12	.39
1977	.03	.09	. 11	. 39
1978	.03	.09	. 13	.39
Property 1974	.20	.75	. 71	2.75
1975	. 16	.66	.62	2.51
1976	. 14	.60	.55	2.40
1977	. 15	.61	.66	2.57
1978	. 16	.64	.71	2.79
Other 1974	.02	.23	.09	.84
1975	.02	.23	.09	.87
1976	.02	.21	.09	.83
1977	.03	.27	. 12	1.15
1978	.02	.26	. 11	1.13



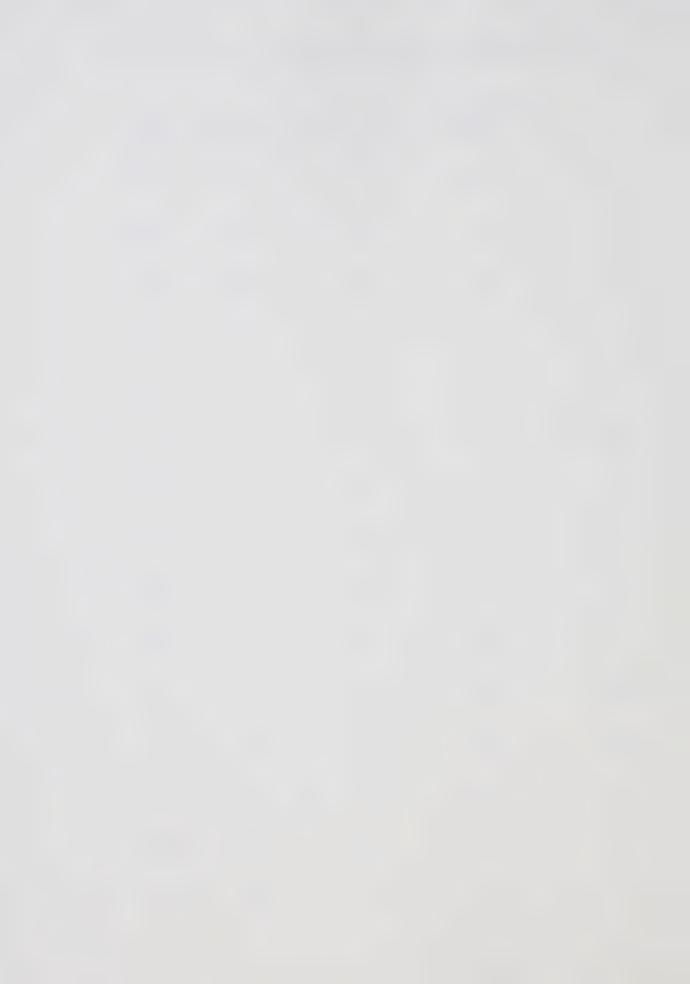
Juvenile to Adult Offender Ratios by Offence Type for Alberta, 1974-1978

	Traditional Ratio	Diversion Controlled Ratio	Population Controlled Ratio	New Ratio
Violence 1974	.05	. 10	. 15	.30
1975	.05	. 10	. 17	.33
1976	. 05	.09	. 18	.33
1977	.06	.09	.21	.33
1978	.06	.46	. 25	2.01
Property 1974	. 40	.75	1.27	2.36
1975	. 36	.62	1.20	2.06
1976	.38	.60	1.31	2.09
1977	. 33	.48	1.19	1.75
1978	. 29	. 7 1	1.28	3.13
Other 1974	. 10	. 38	.31	1.21
1975	.10	.31	.32	1.02
1976	.09	.24	.30	.82
1977	.07	. 19	.24	.71
1978	.07	.30	.29	1.33



Juvenile to Adult Offender Ratios by Offence Type for British Columbia, 1974-1978

	Traditional Ratio	Diversion Controlled Ratio	Population Controlled Ratio	New Ratio
Violence 1974	.07	. 13	. 27	. 47
1975	.07	. 12	. 28	. 48
1976	.08	. 17	. 34	.68
1977	.09	.20	. 37	.83
1978	.09	. 19	. 41	.84
Property 1974	. 46	.73	1.72	2.71
1975	.43	.71	1.67	2.74
1976	. 48	.85	1.92	3.42
1977	. 44	.88	1.85	3.68
1978	. 48	.83	2.11	3.61
Other 1974	.09	.23	. 34	.87
1975	.09	.27	. 34	1.04
1976	. 12	. 46	.50	1.84
1977	. 12	.50	.51	2.08
1978	. 15	. 48	.63	2.11



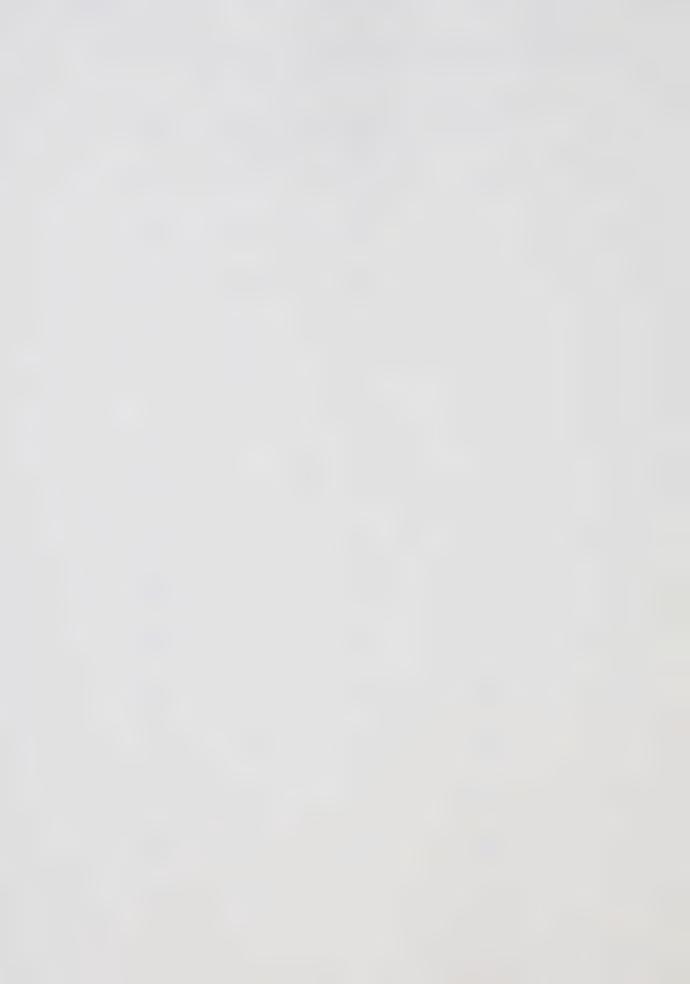
Juvenile to Adult Offender Ratios by Offence Type for the Yukon Territory, 1974-1978

	Traditional Ratio	Diversion Controlled Ratio	Population Controlled Ratio	New Ratio
Violence 1974	.02	.03	.08	. 10
1975	.05	.06	. 17	.21
1976	. 10	. 12	. 37	. 45
1977	. 13	. 18	.50	.69
1978	.03	.07	. 13	.29
Property 1974	.30	. 52	1.01	1.78
1975	.36	.50	1.28	1.78
1976	. 37	. 49	1.39	1.84
1977	.33	.73	1.27	2.85
1978	.28	.59	1.19	2.50
Other 1974	.05	. 12	. 18	. 41
1975	.04	.07	. 13	.25
1976	. 05	.09	. 18	.34
1977	.05	. 17	. 18	.66
1978	.05	.34	.20	1.45



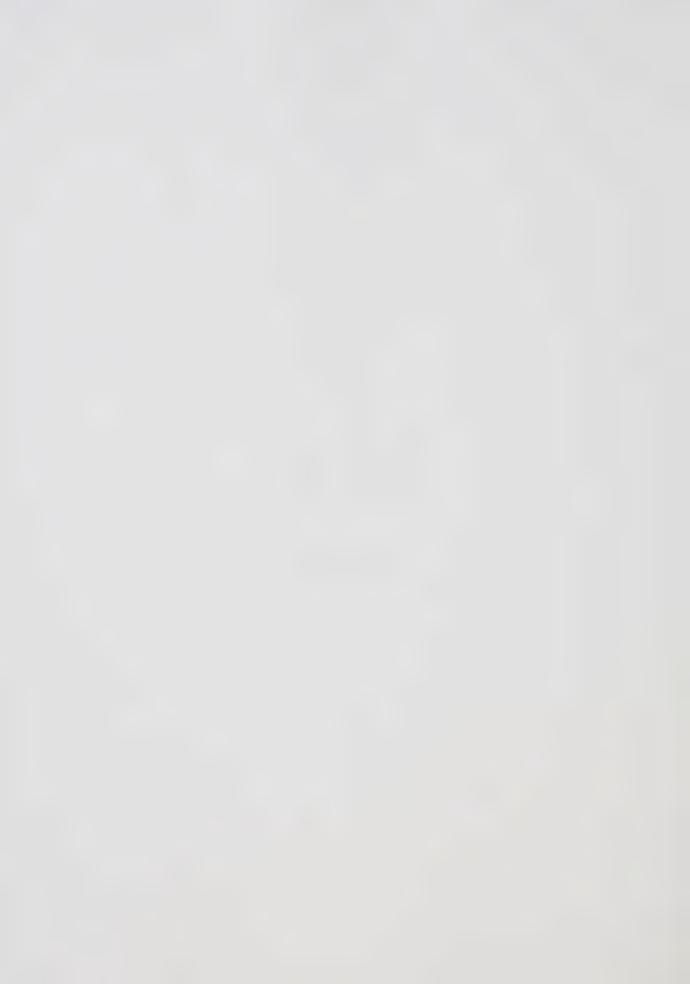
Juvenile to Adult Offender Ratios by Offence Type for the Northwest Territories, 1974-1978

	Traditional Ratio	Diversion Controlled Ratio		New Ratio
Violence 1974	.03	.07	. 07	. 18
1975	.03	.09	.08	.23
1976	.02	.04	. 05	.09
1977	.03	.05	.08	. 14
1978	. 02	.04	. 06	. 12
Property 1974	. 29	.53	.72	1.30
1975	. 19	.58	. 49	1.47
1976	. 29	.62	.78	1.65
1977	.51	.92	1.36	2.49
1978	. 35	.99	.98	2.75
Other 1974	. 02	.09	. 05	.22
1975	.02	. 14	.06	.34
1976	.03	. 13	.08	. 35
1977	. 04	. 15	. 12	.40
1978	.05	.26	. 13	.71

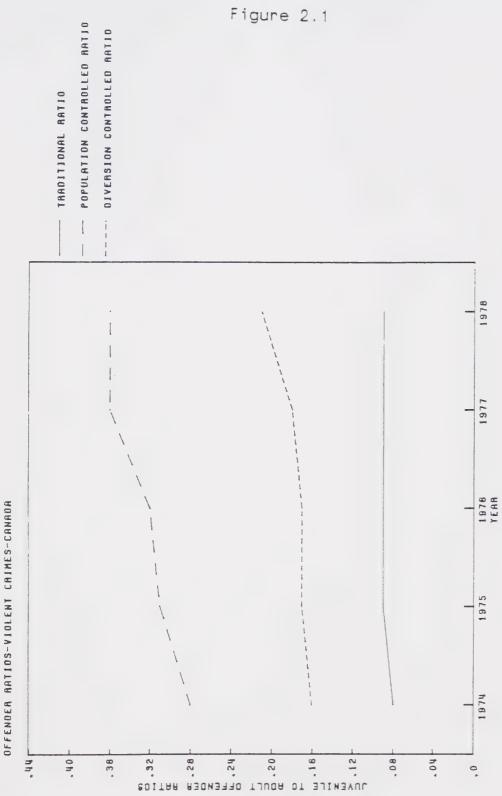


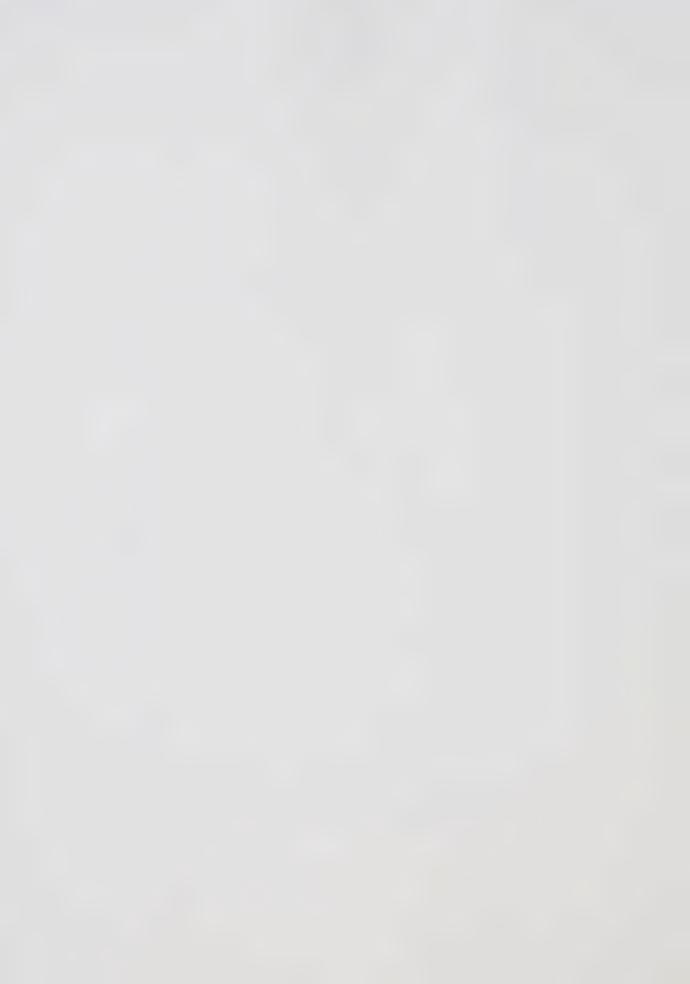
Appendix 2

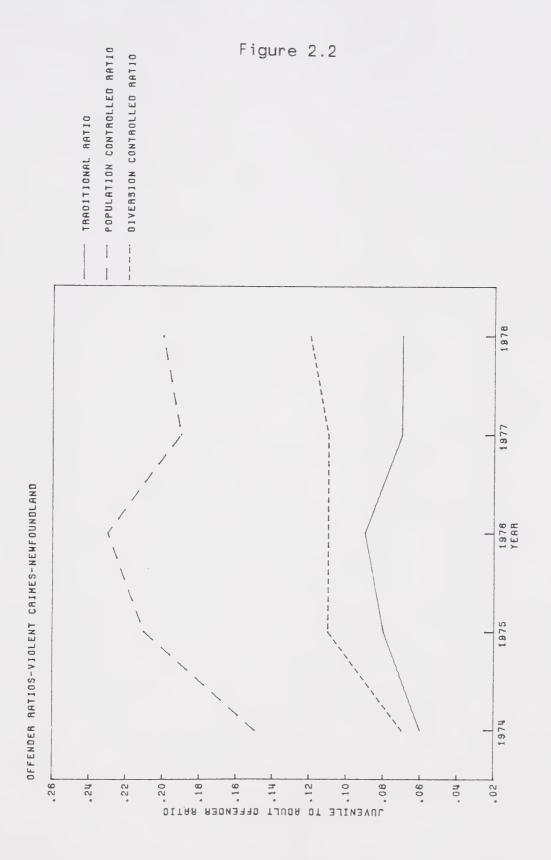
Violent Offences

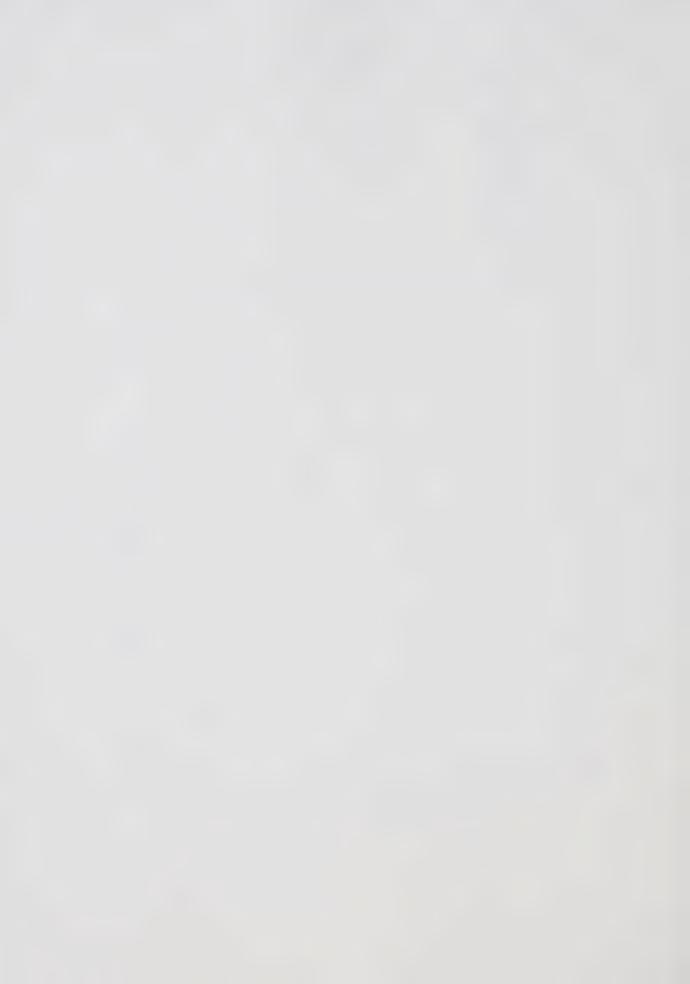


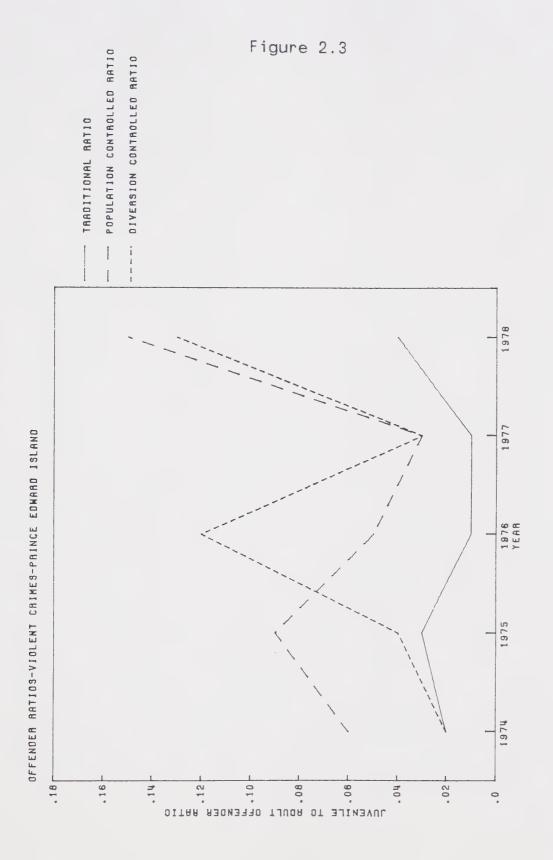




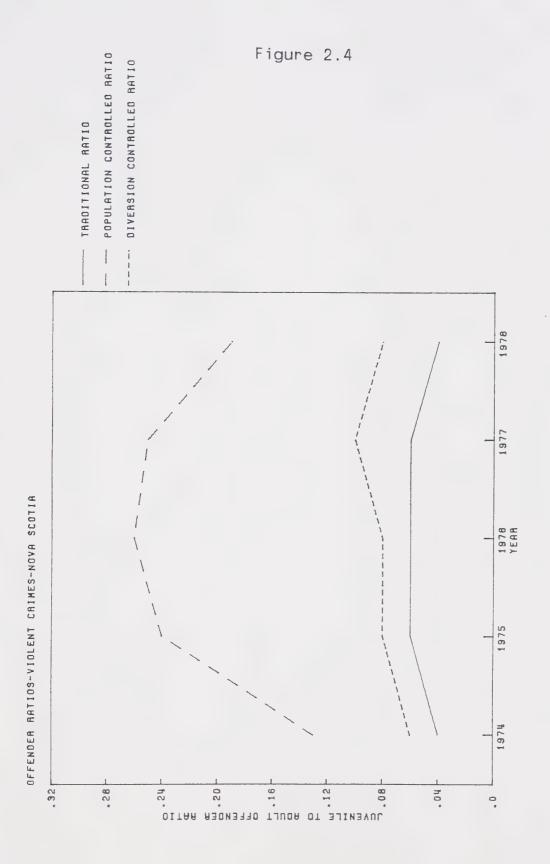


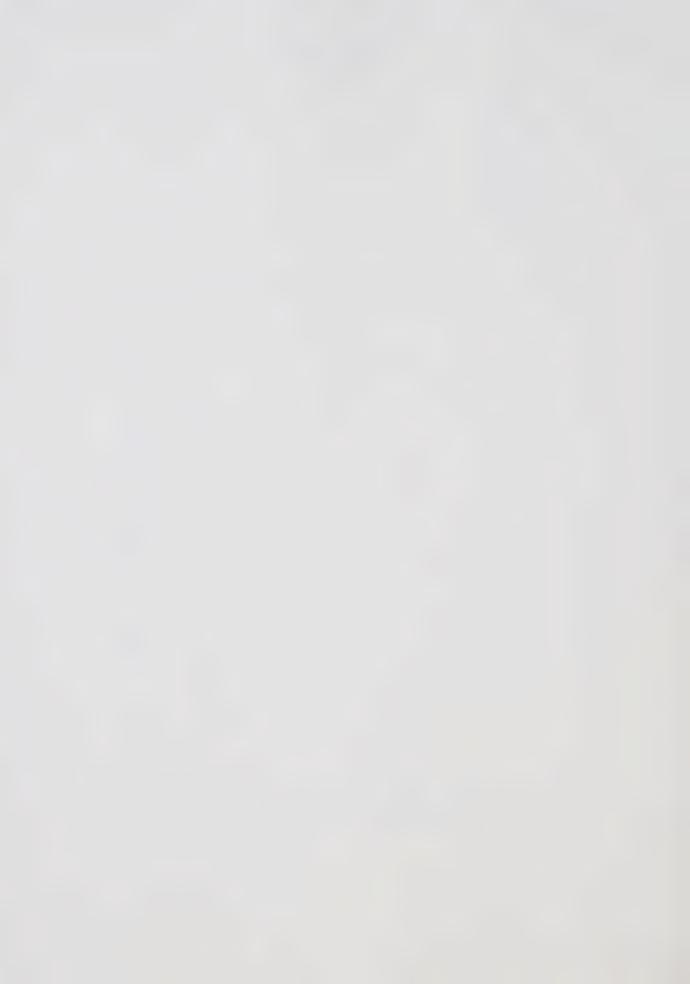


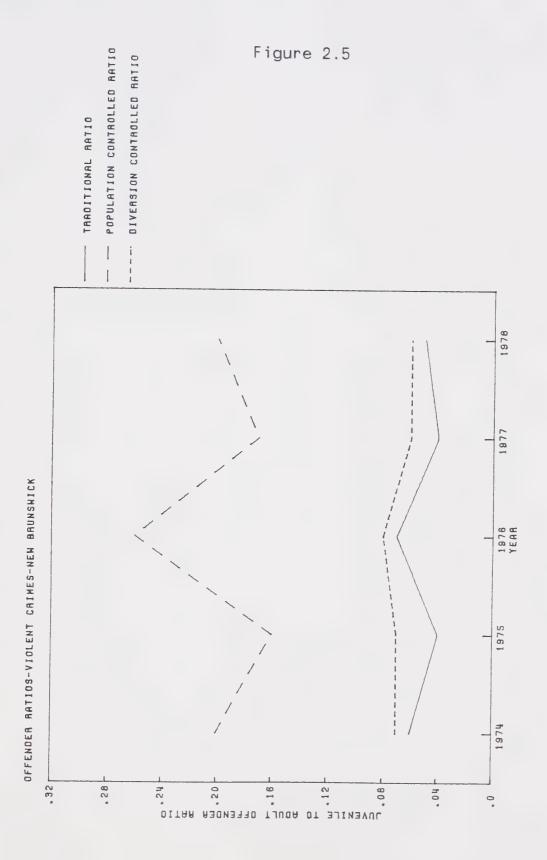












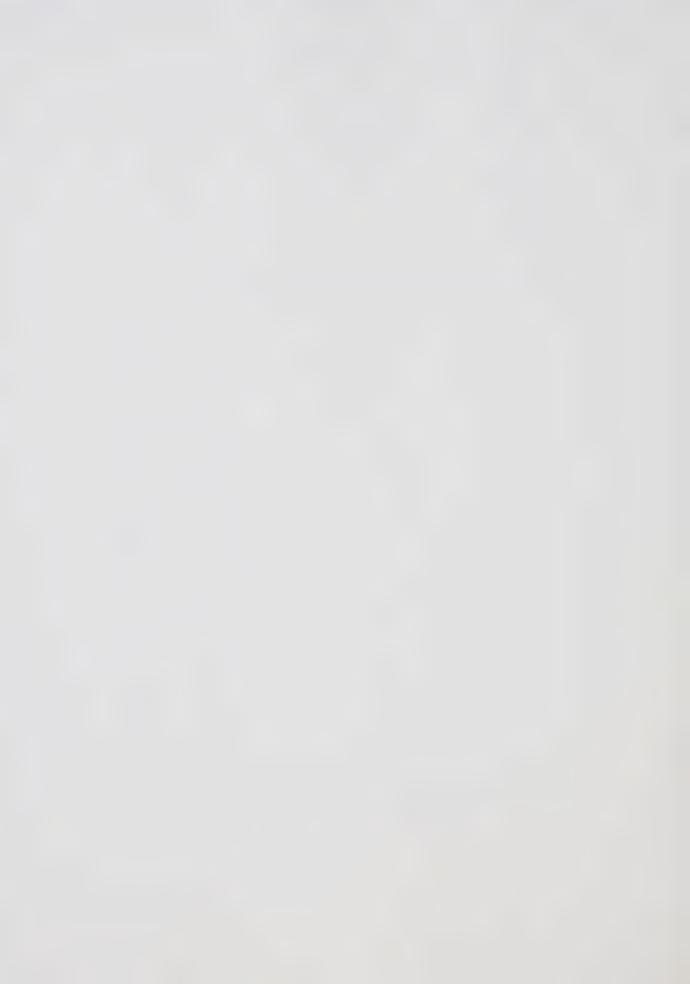
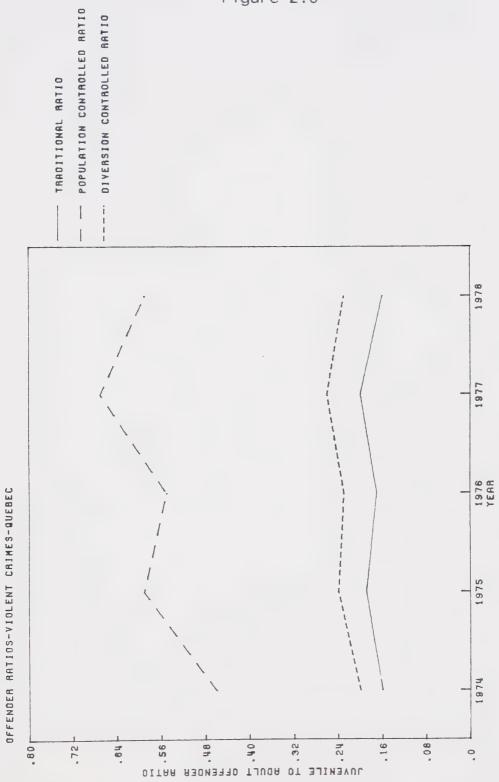
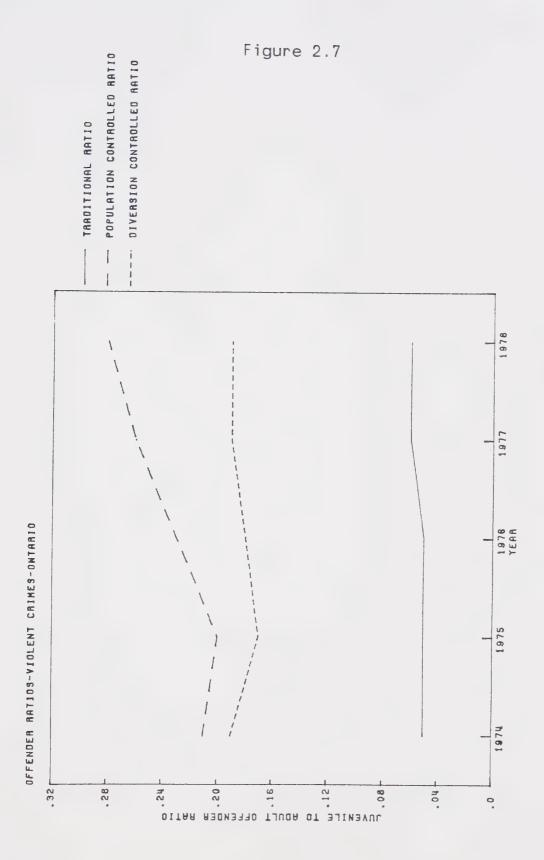
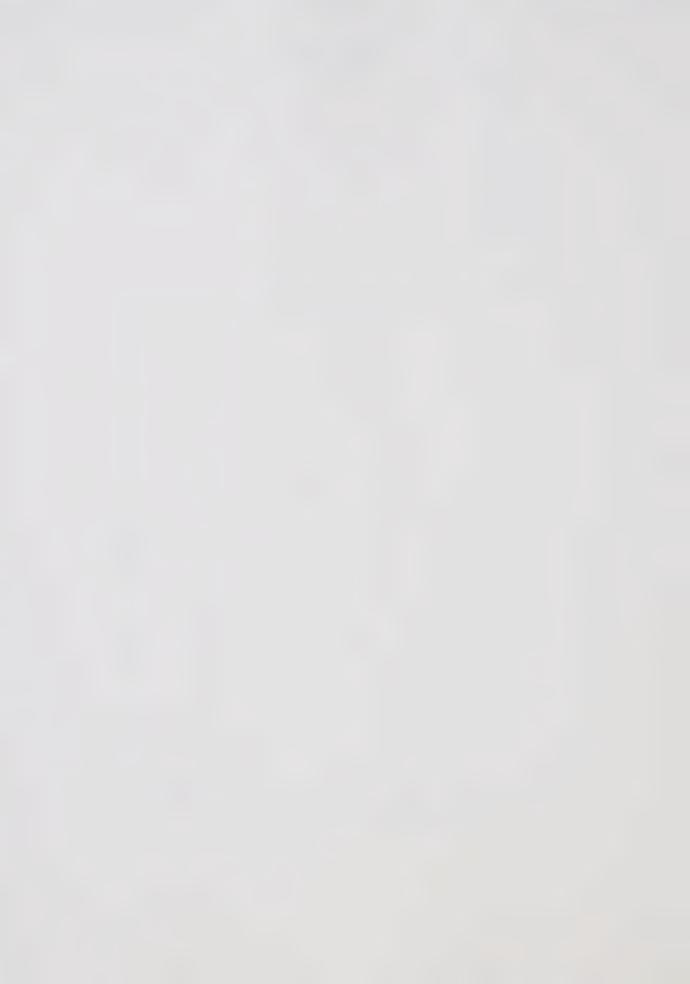
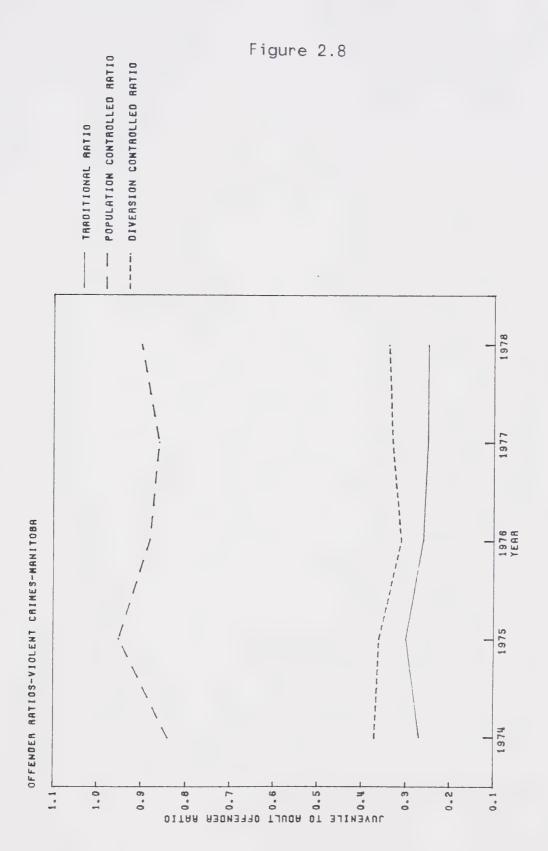


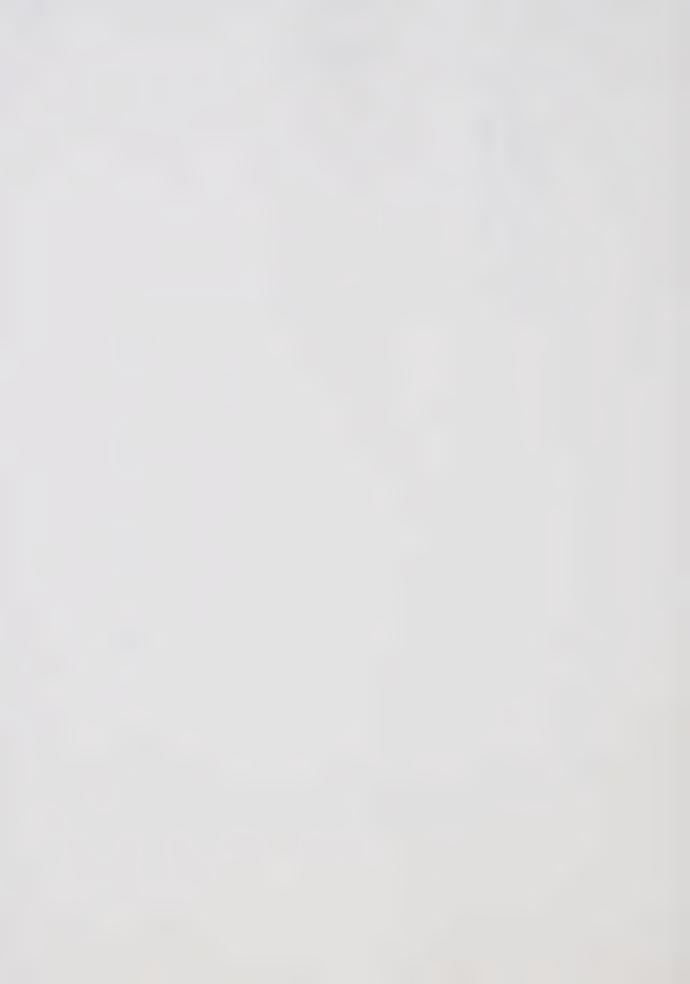
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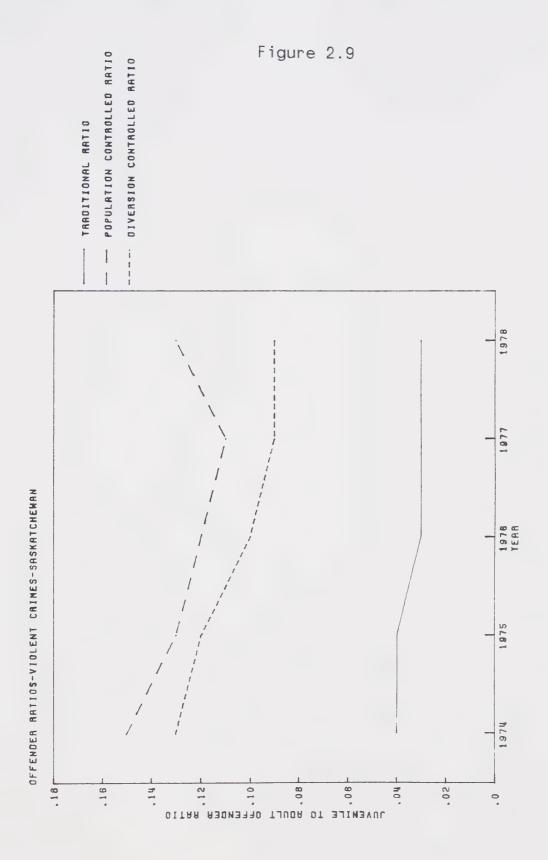


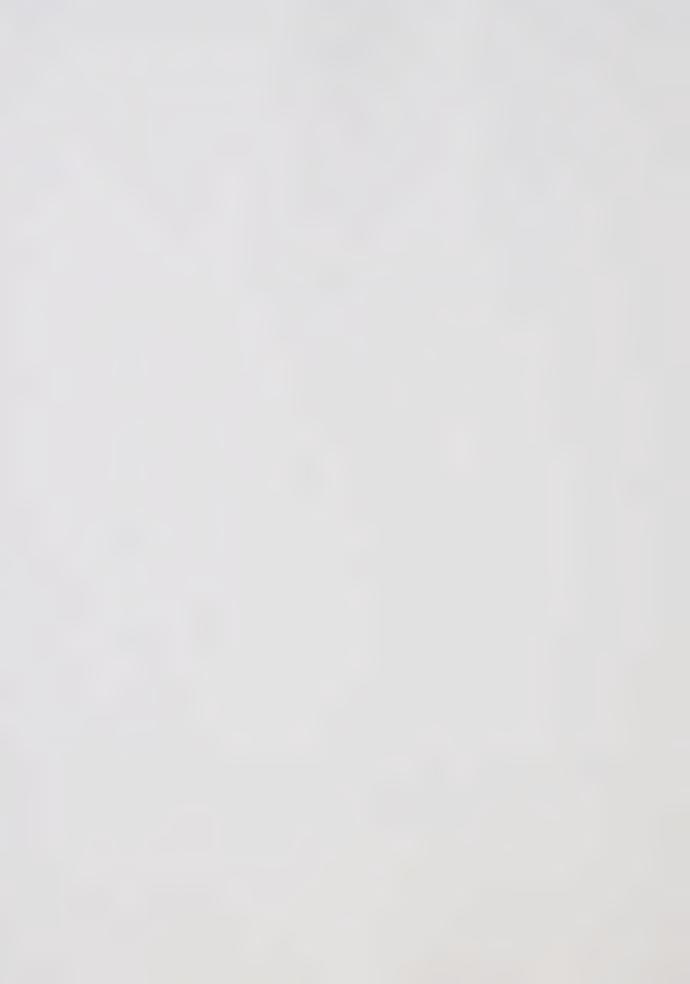


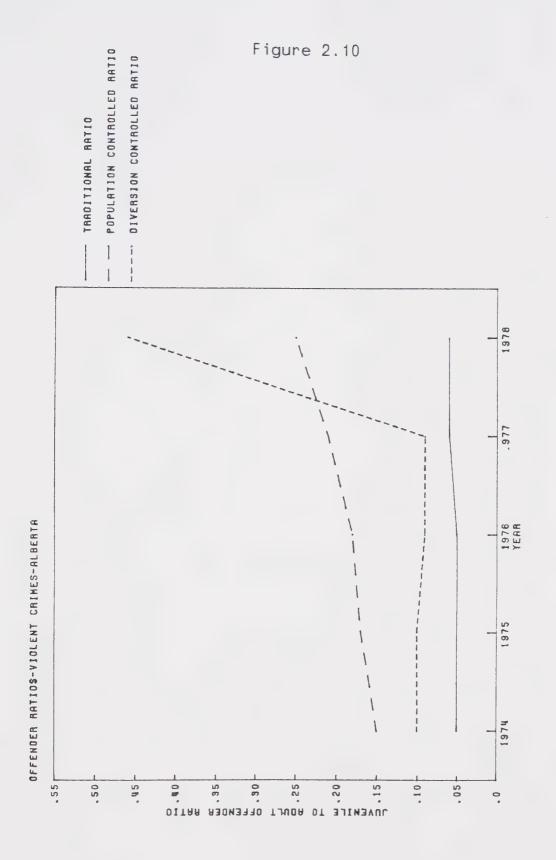














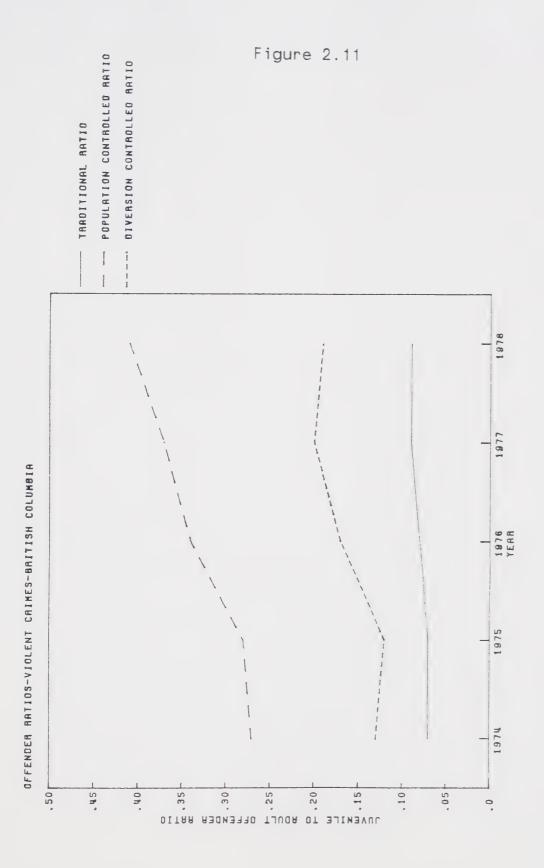
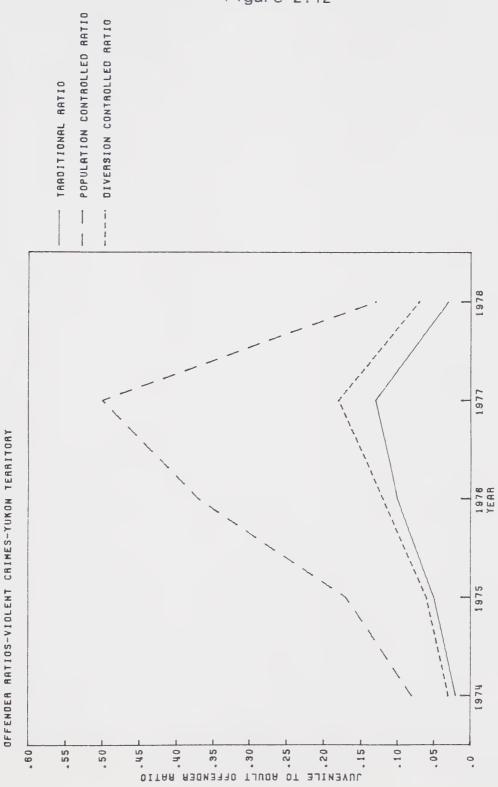
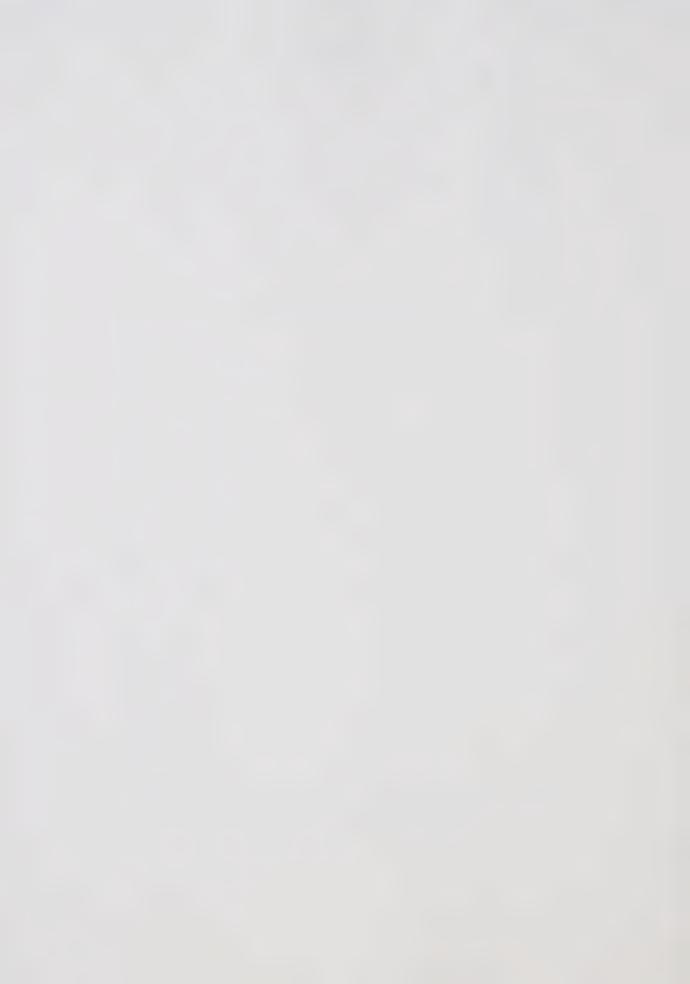




Figure 2.12





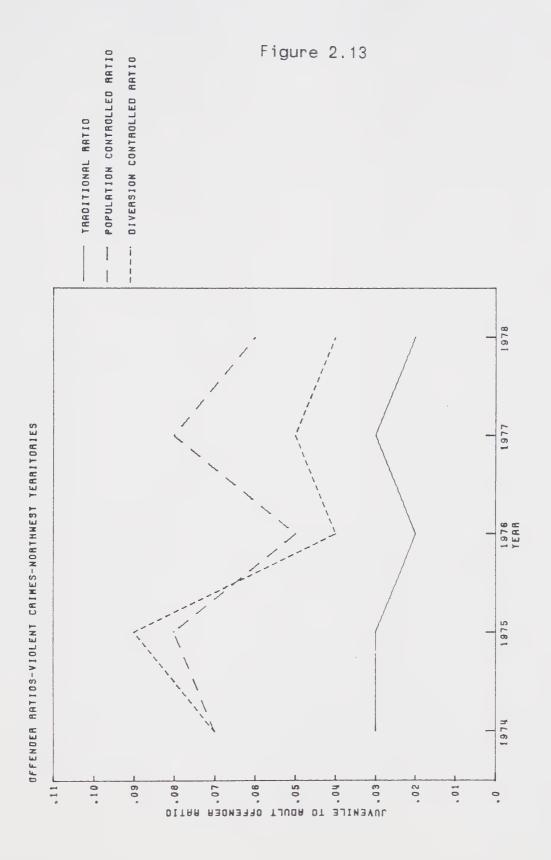
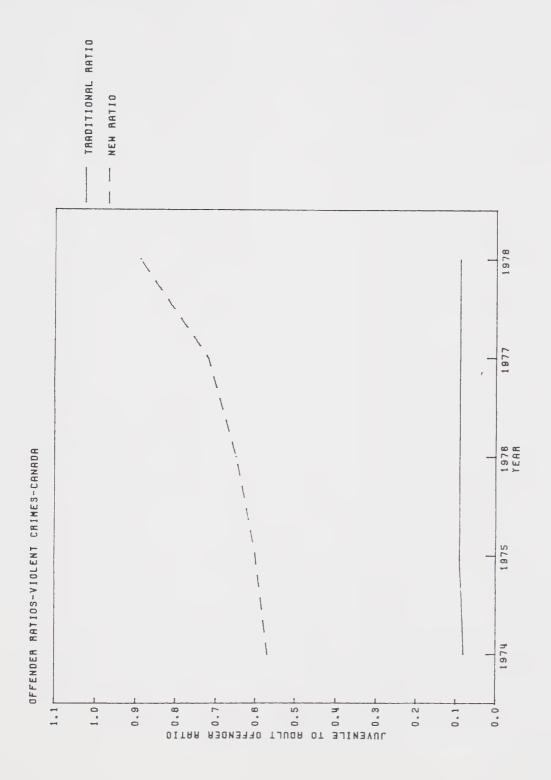




Figure 2.14



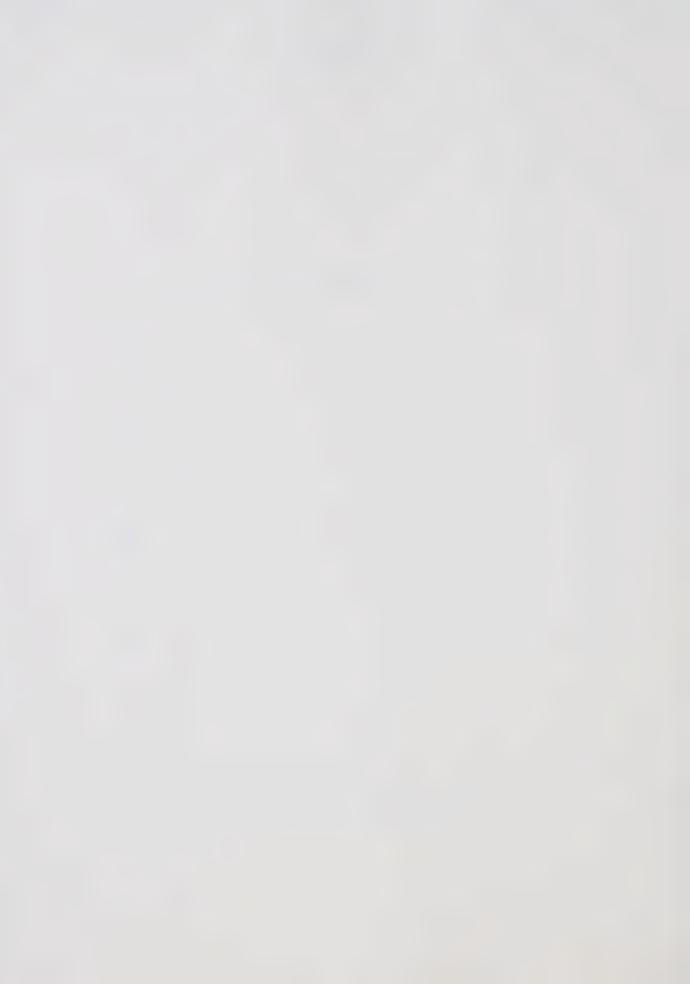


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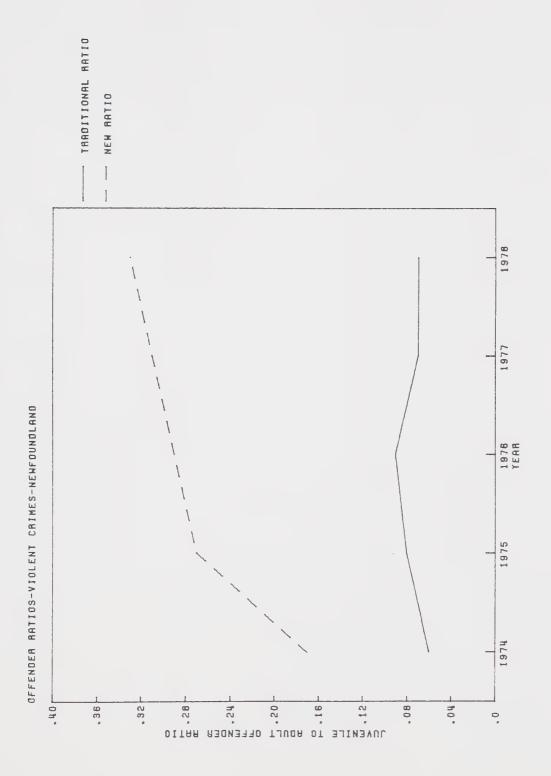




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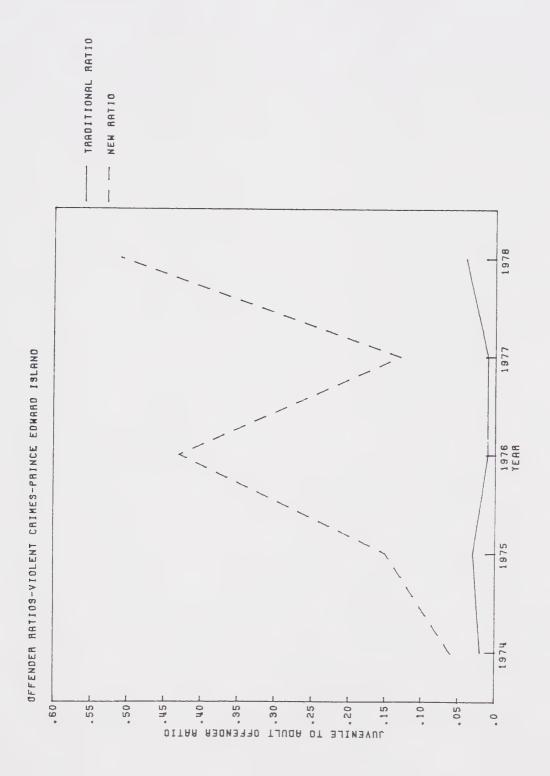




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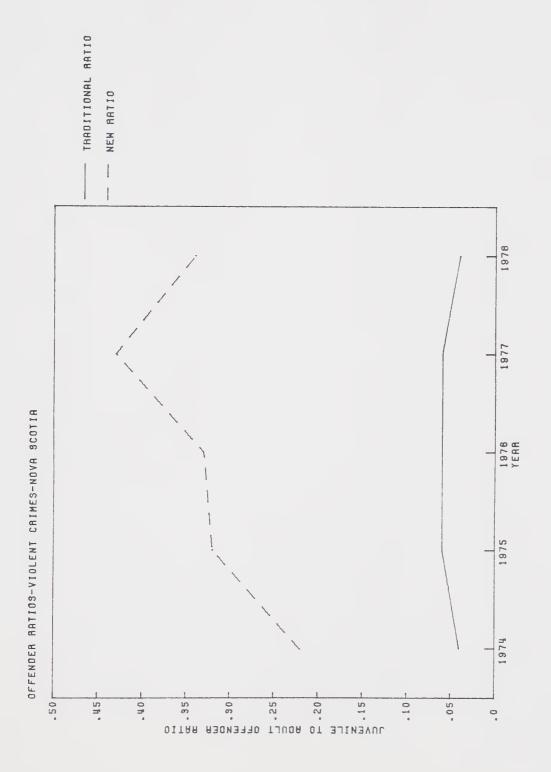




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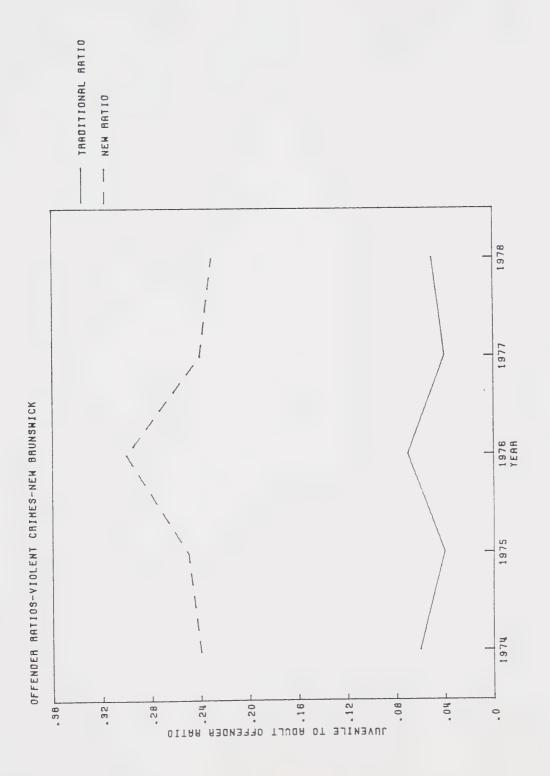
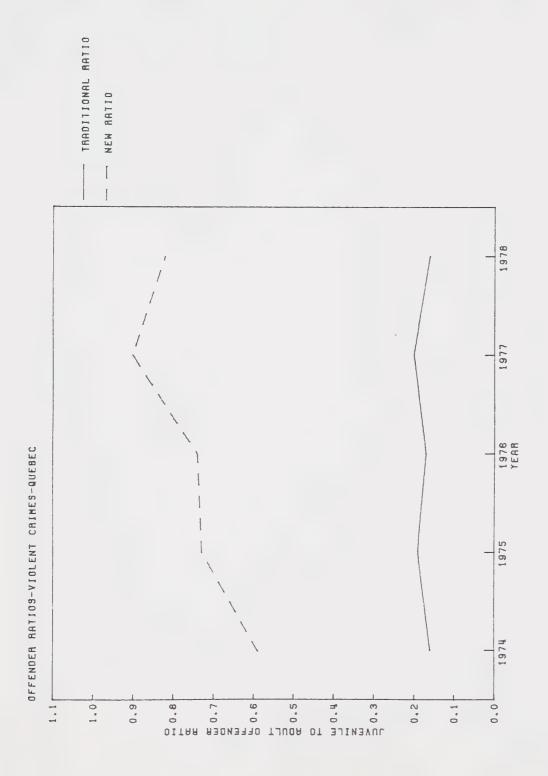




Figure 2.19



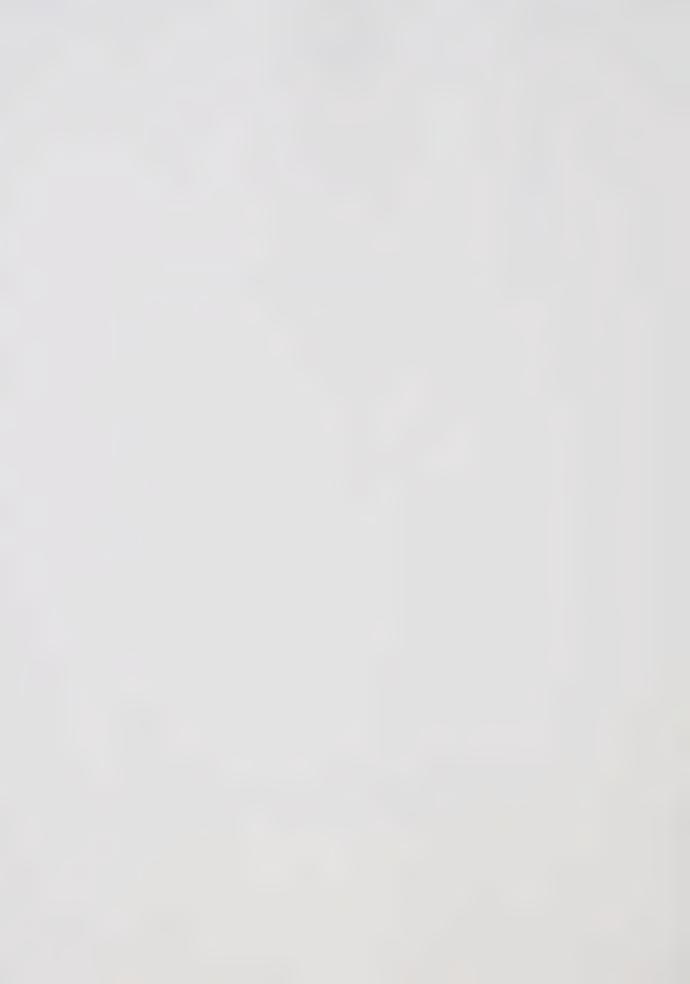


Figure 2.20

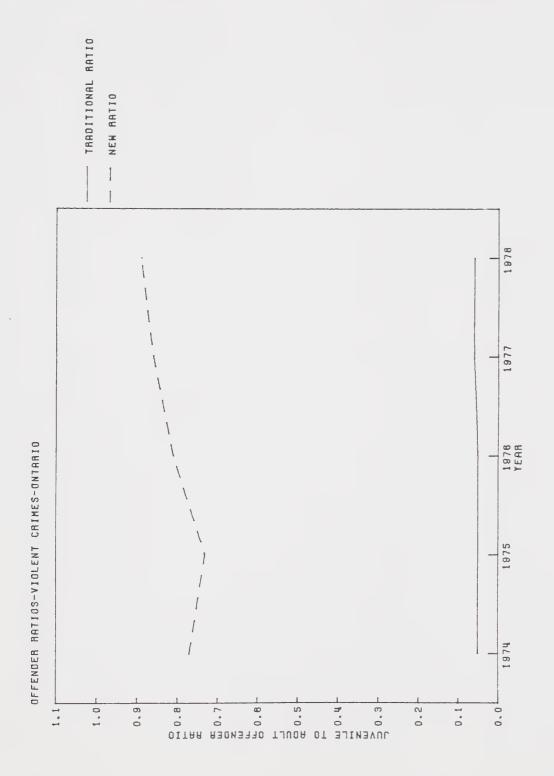
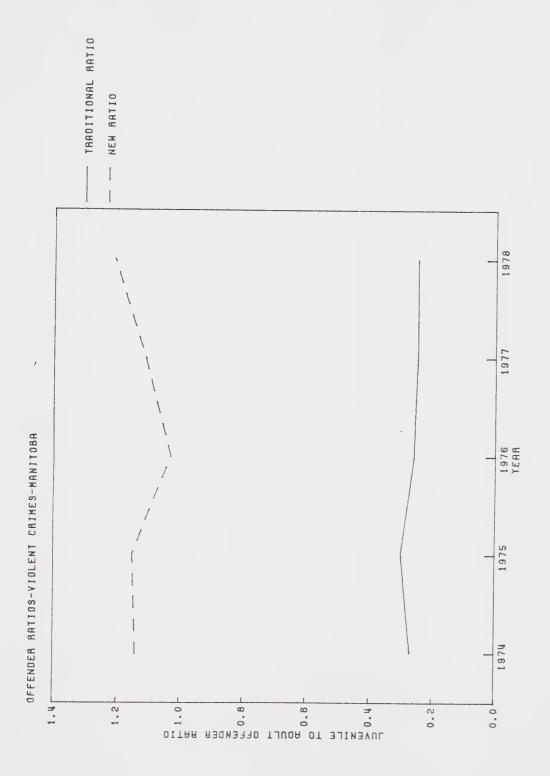


Figure 2.21



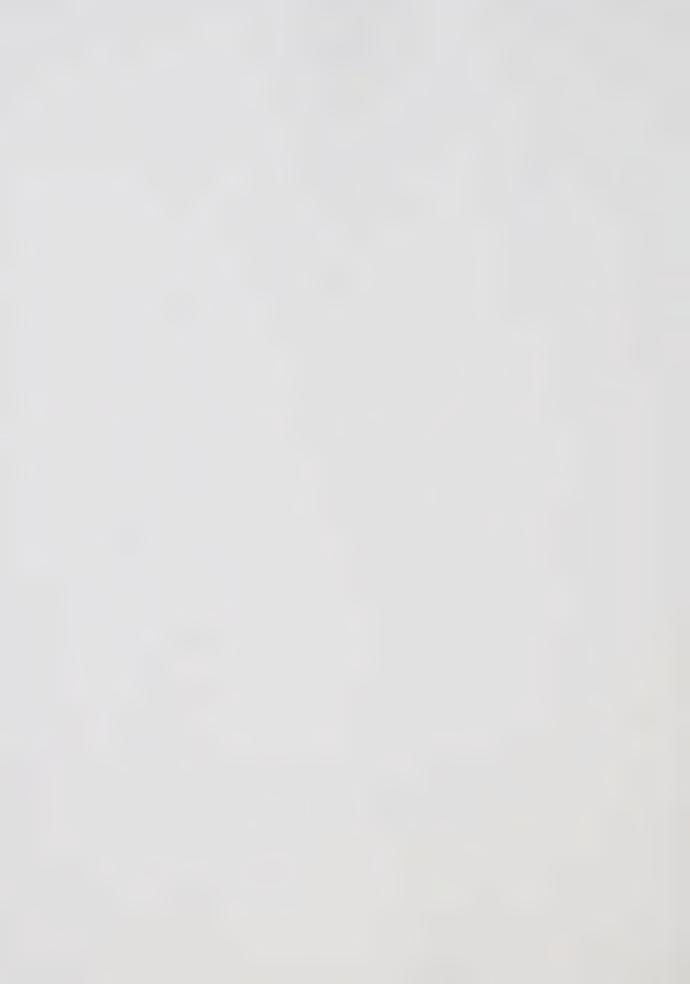
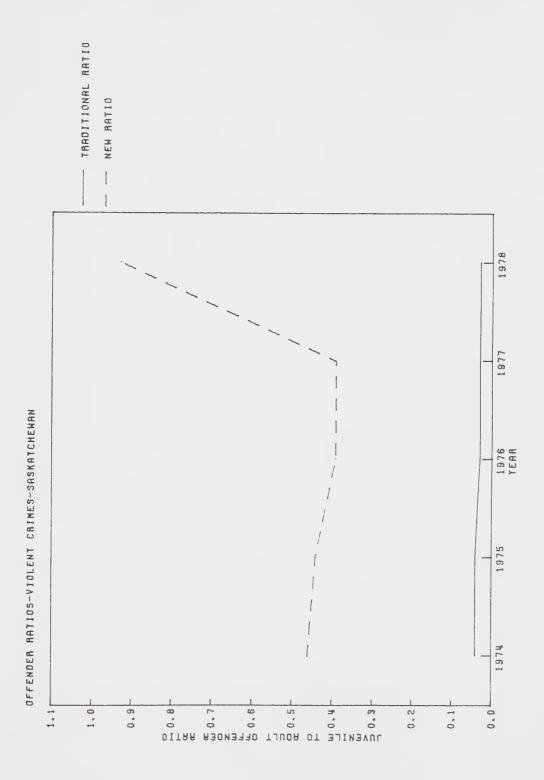


Figure 2.22



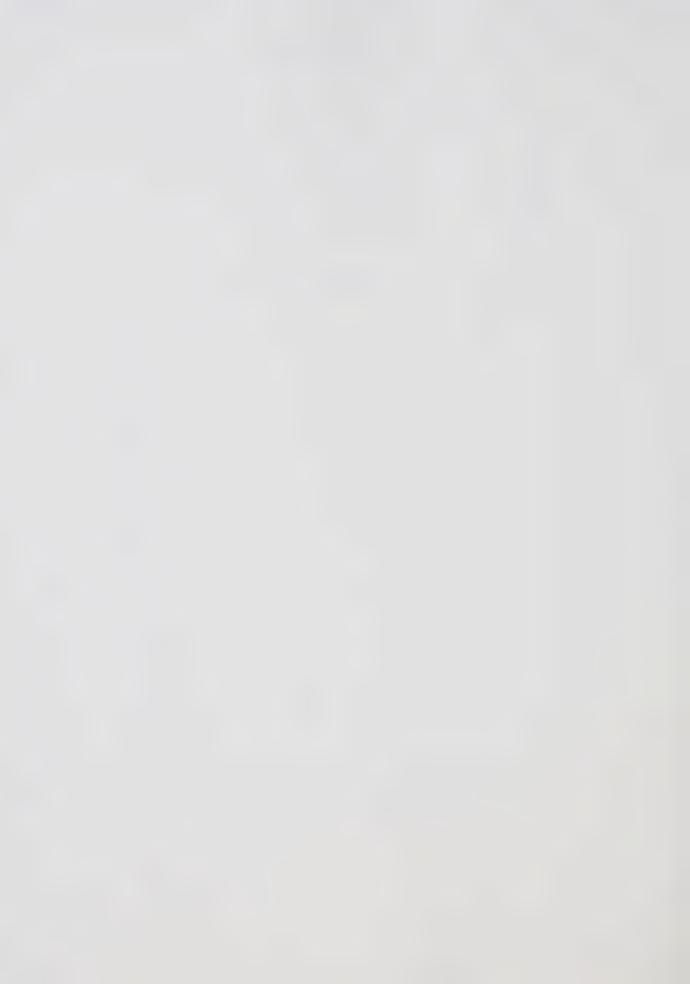
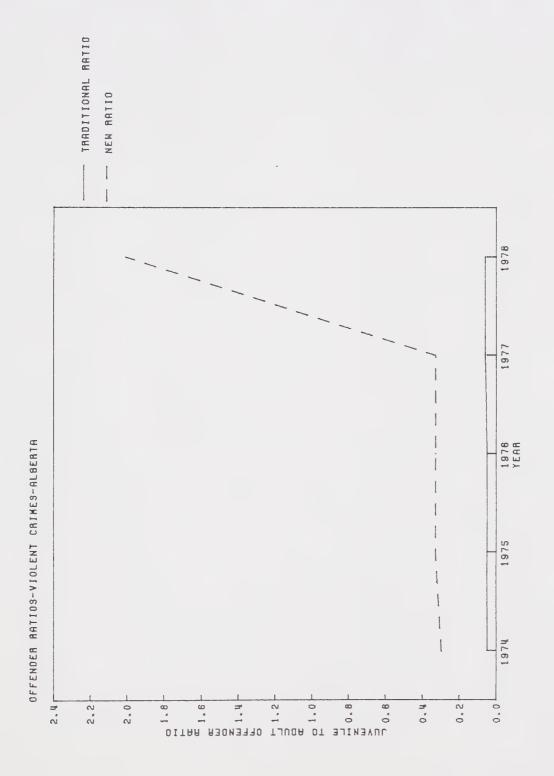


Figure 2.23



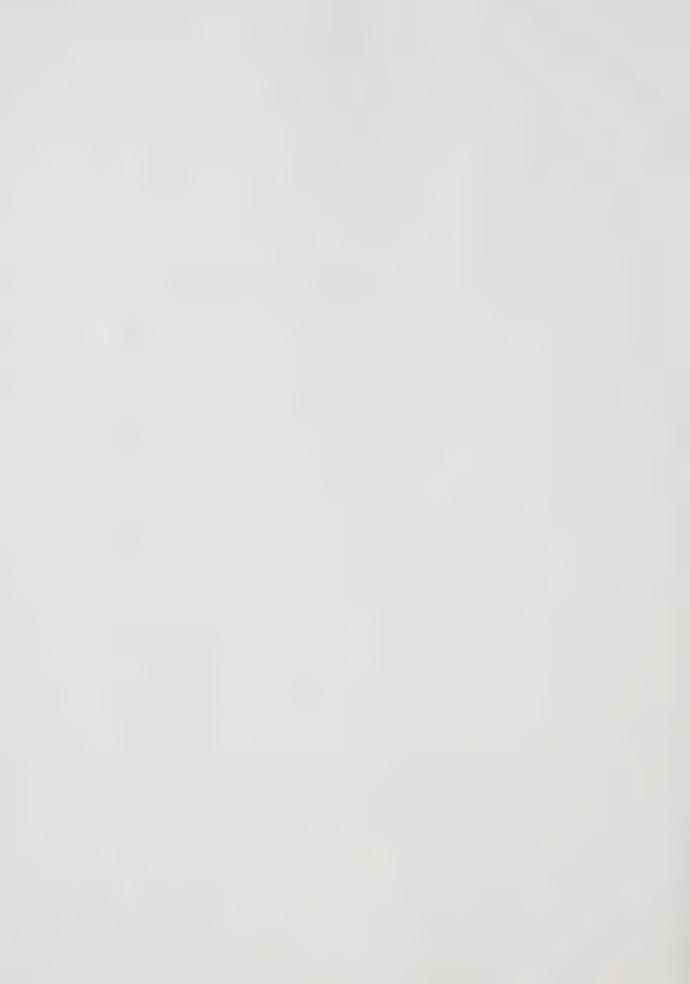
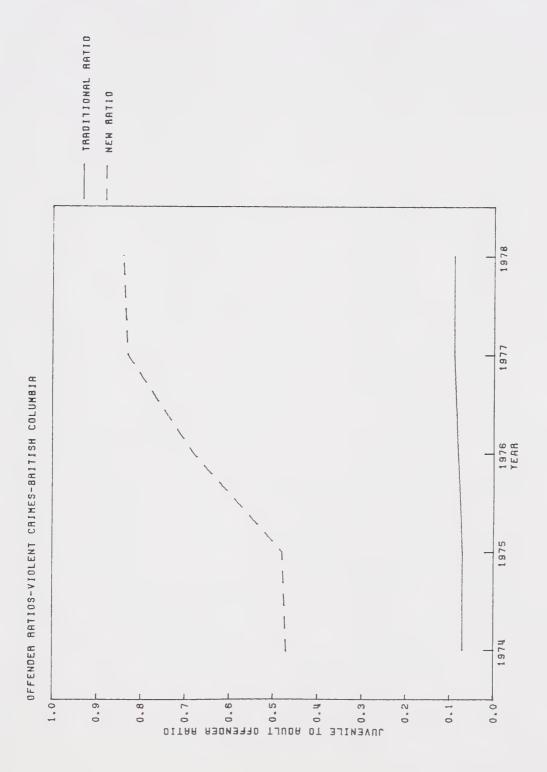


Figure 2.24



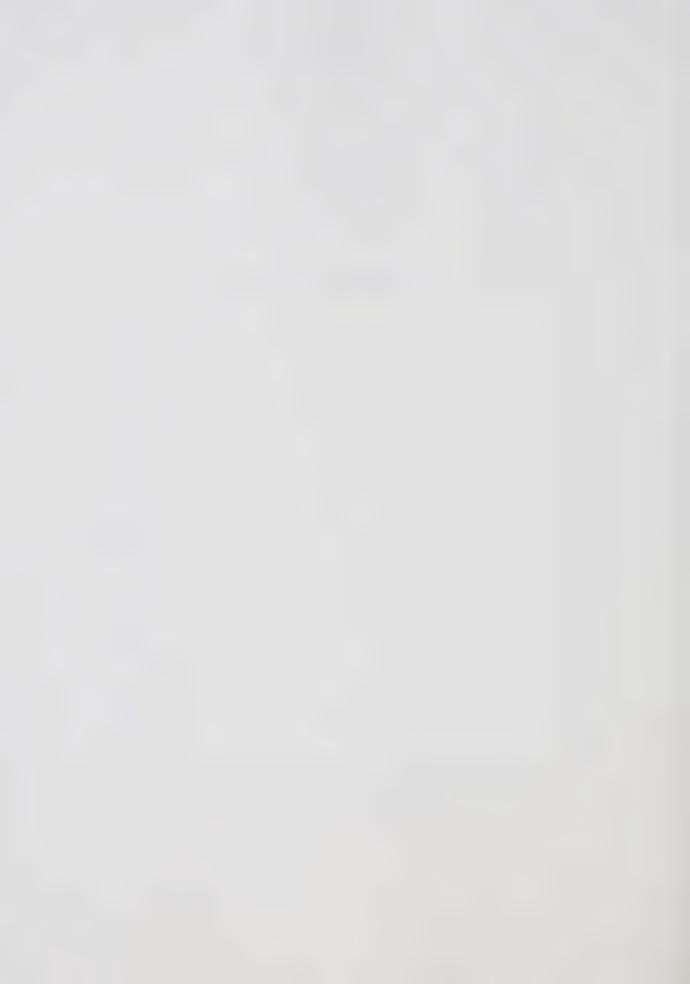
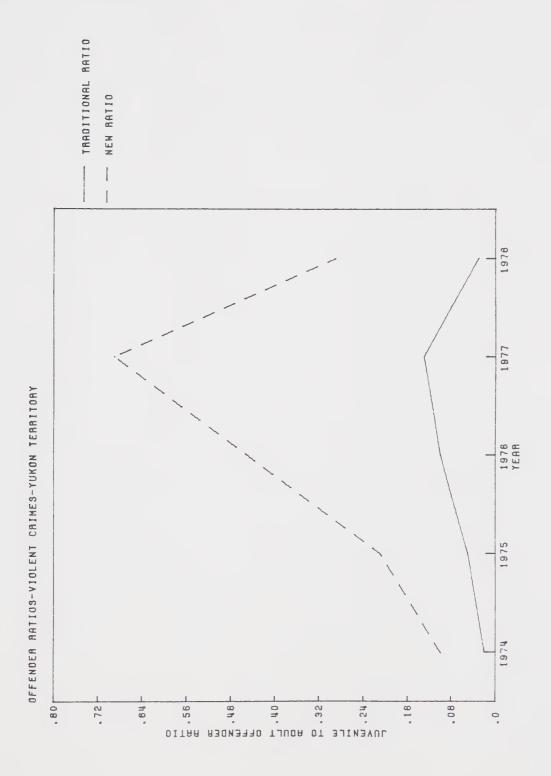


Figure 2.25



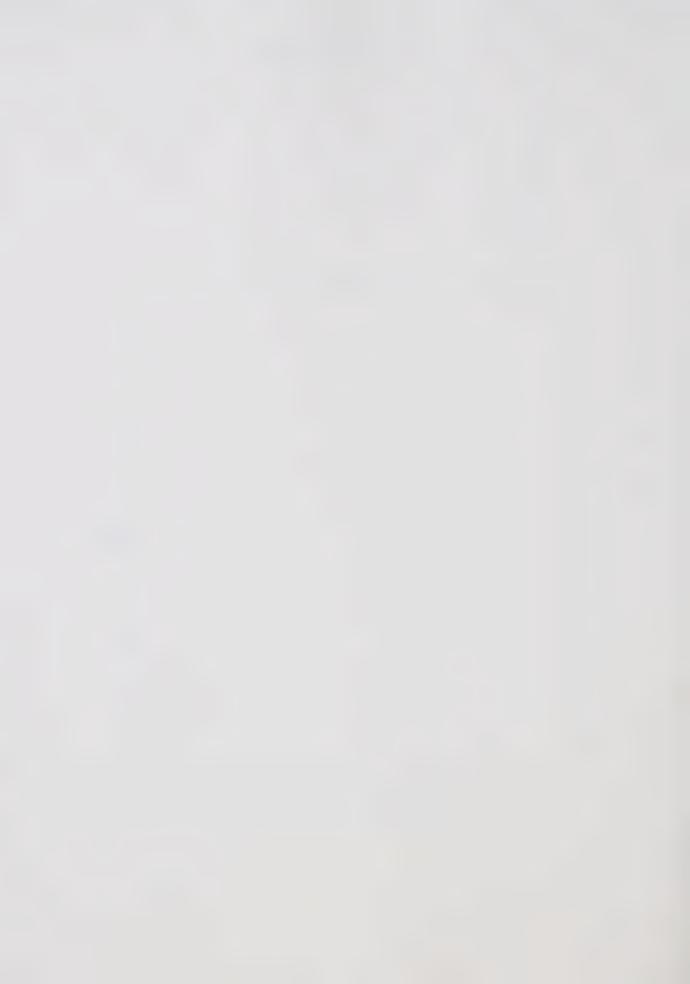
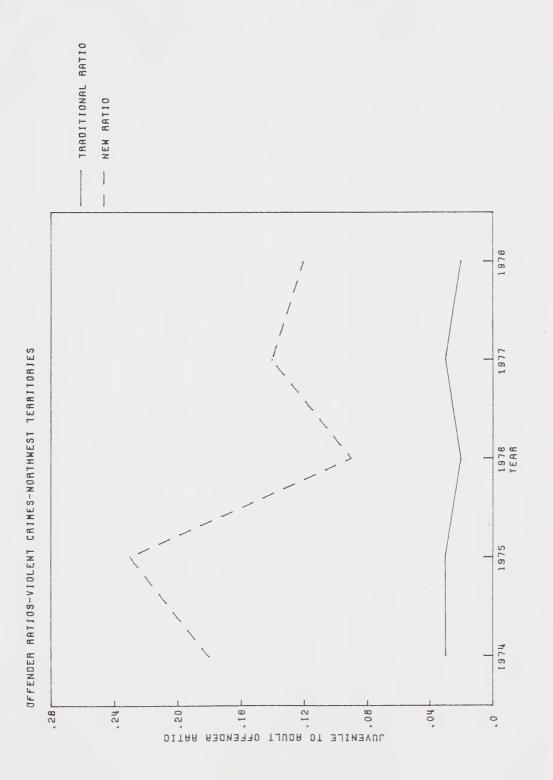
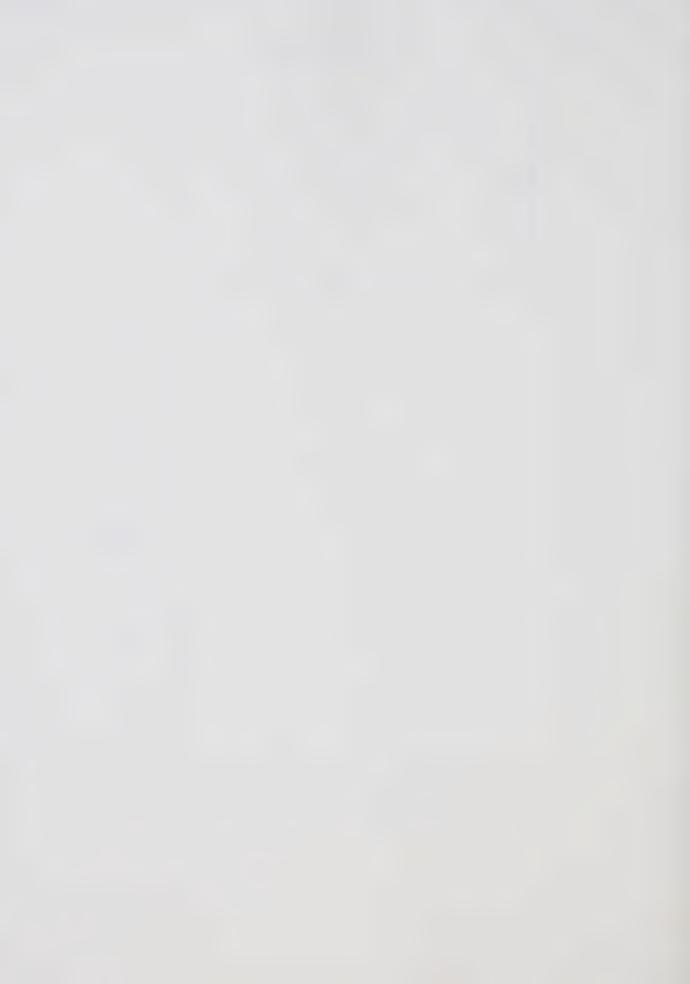


Figure 2.26



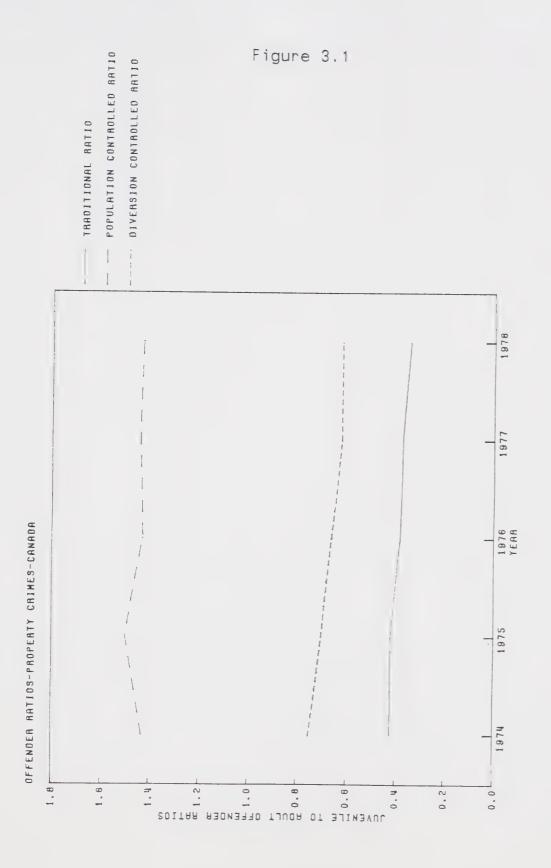
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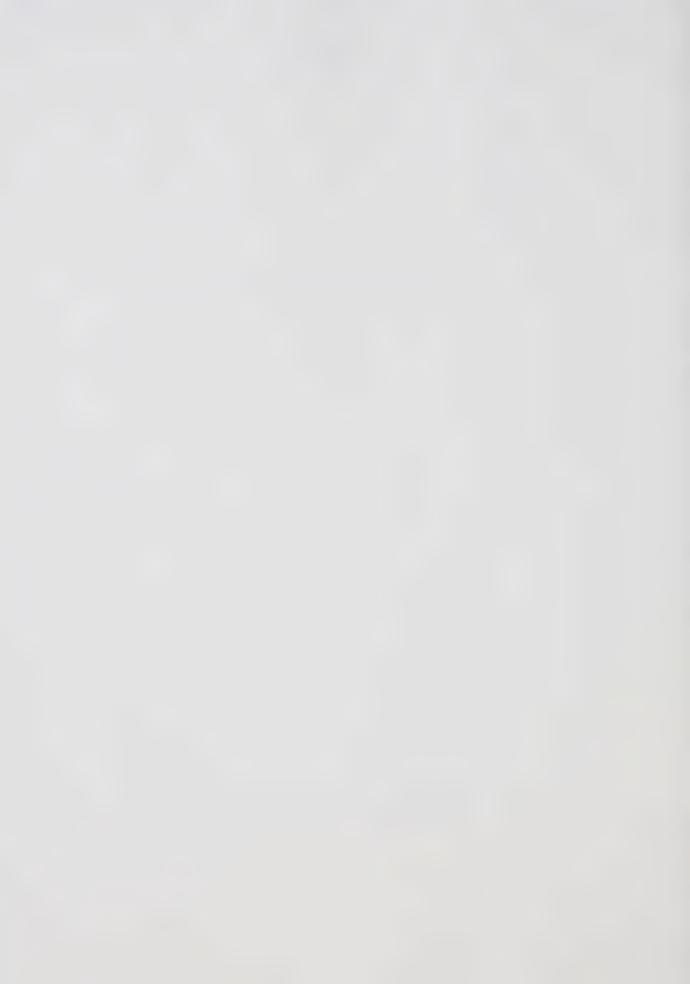


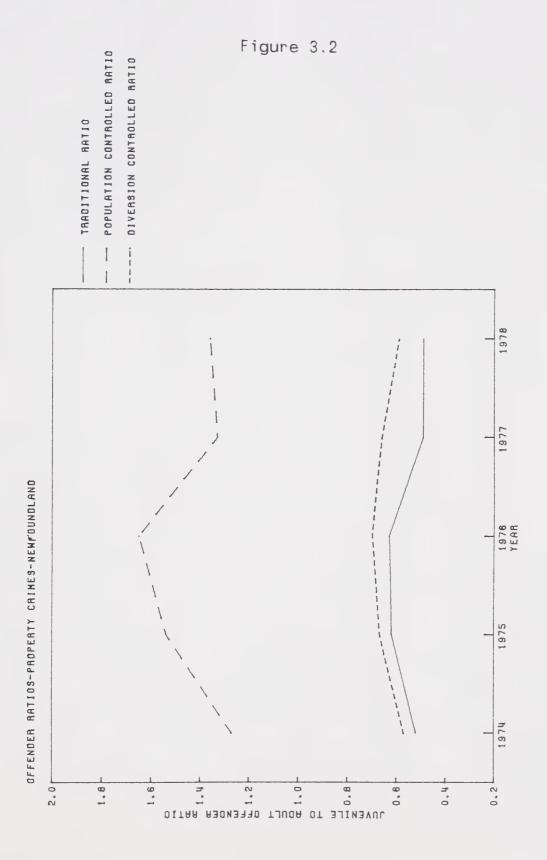
Appendix 3

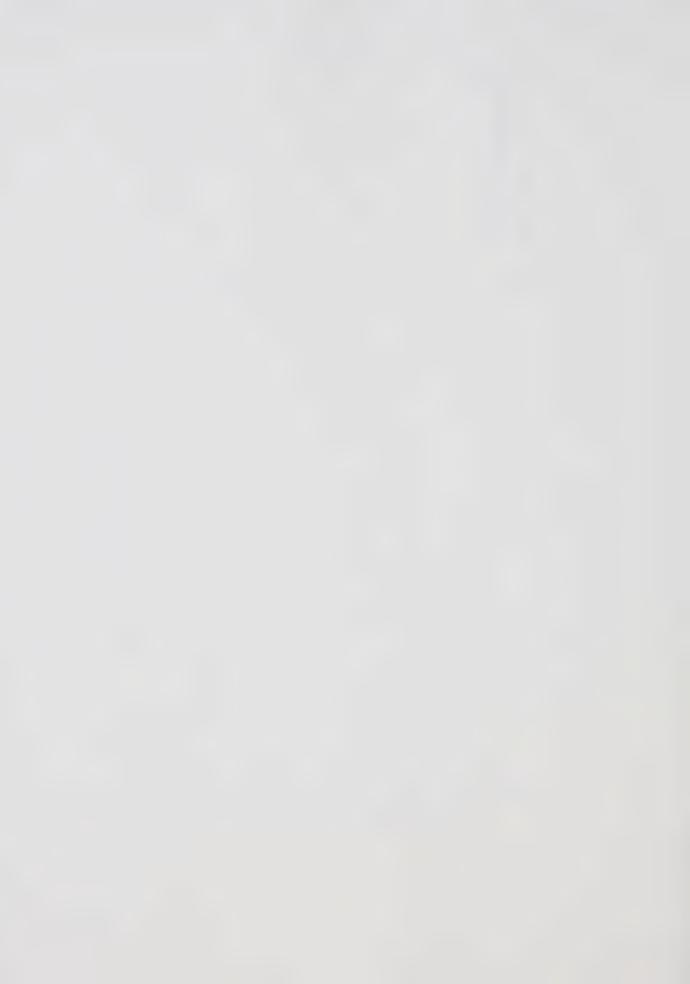
Property Offences

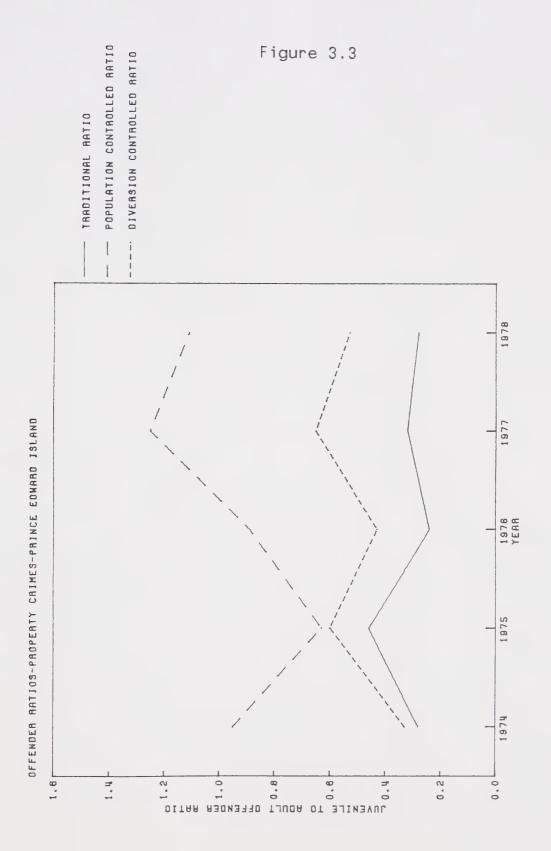


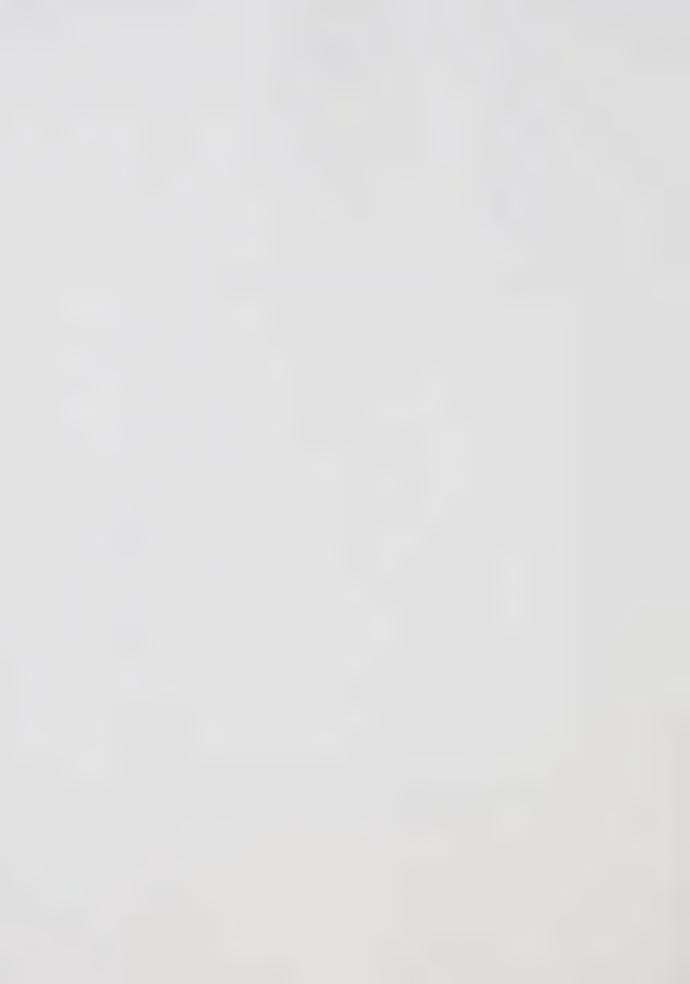


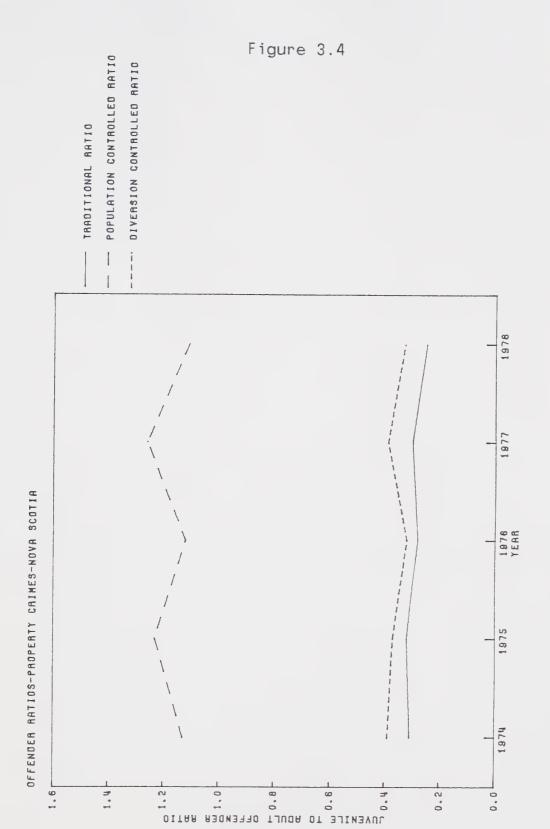












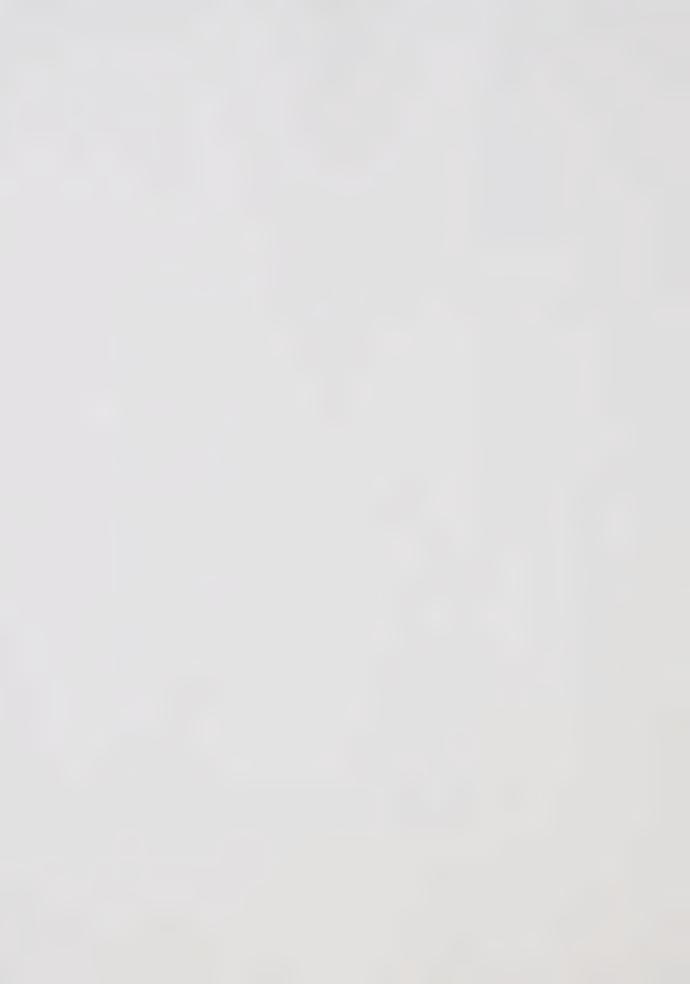
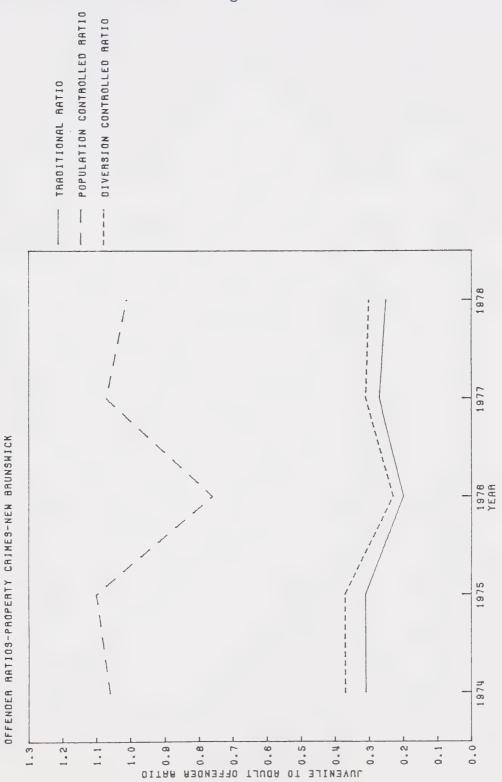
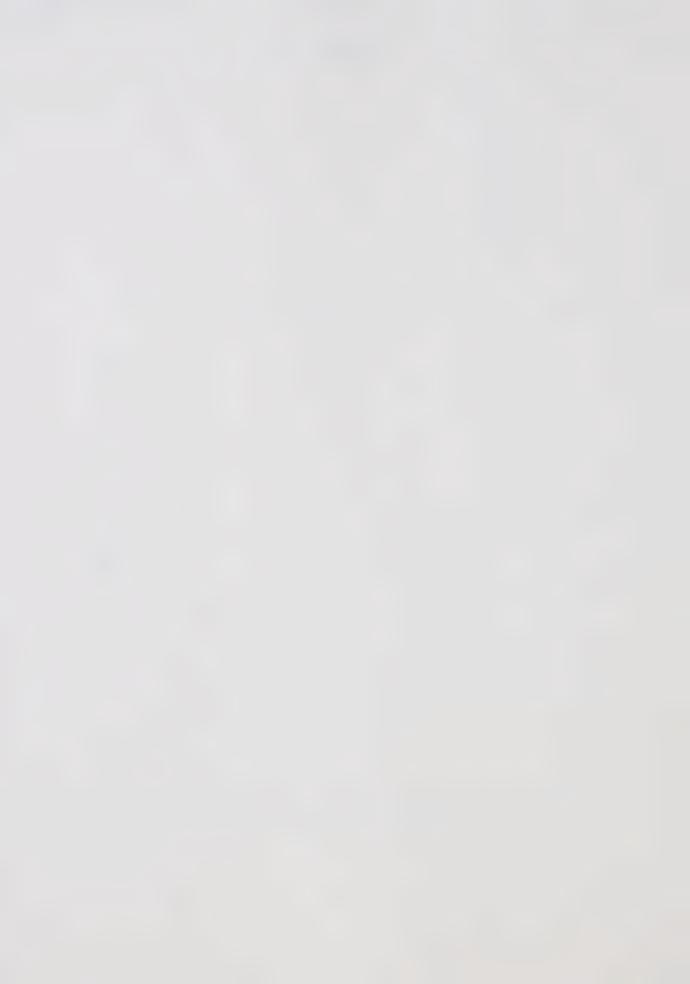
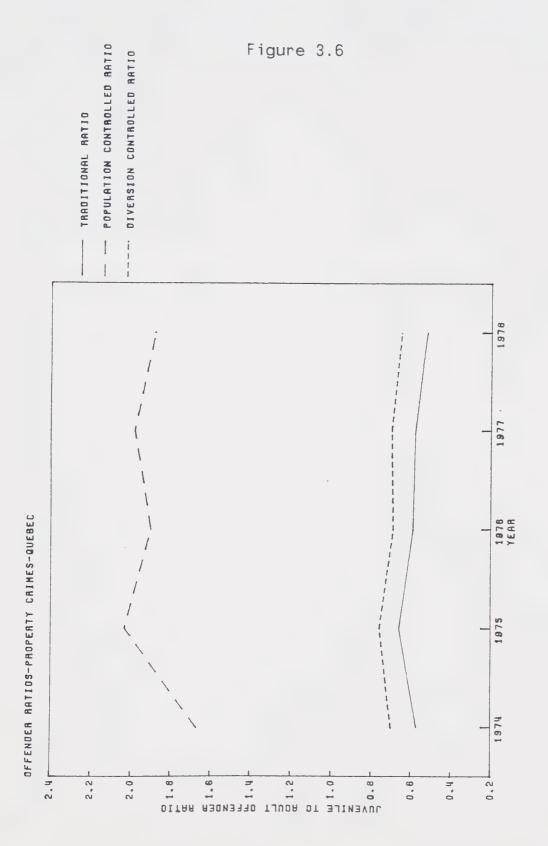
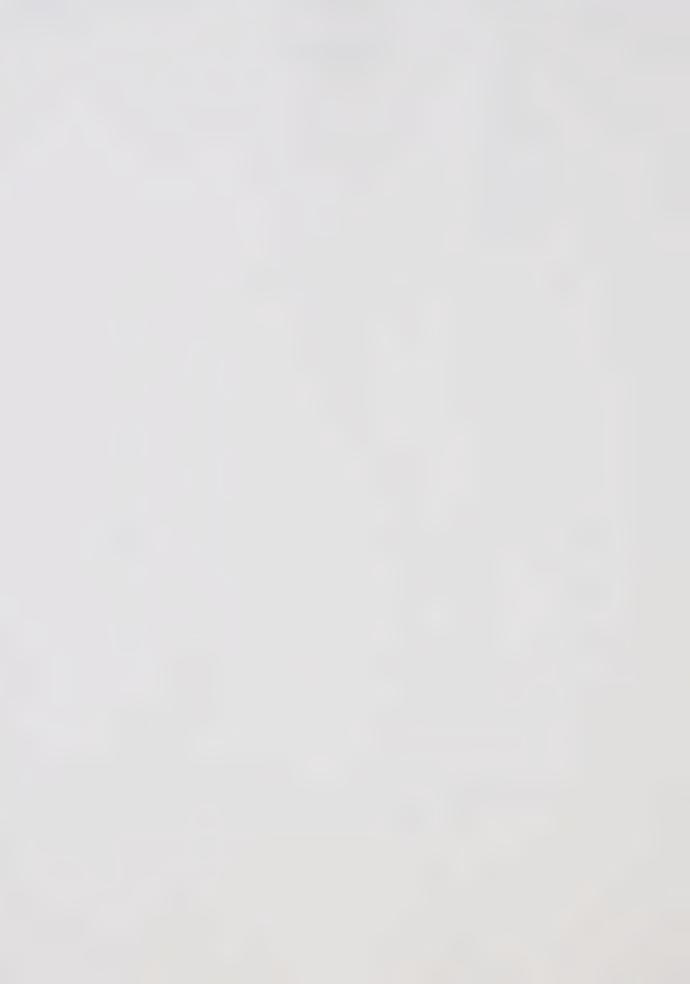


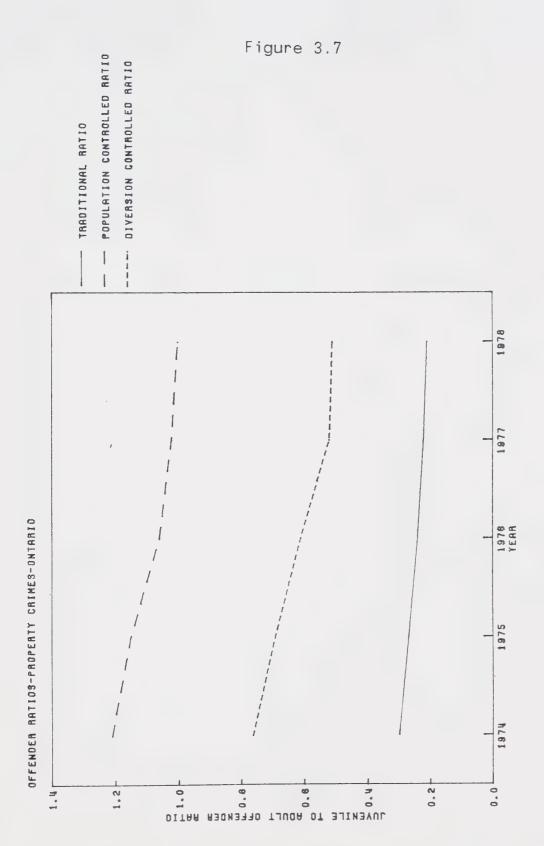
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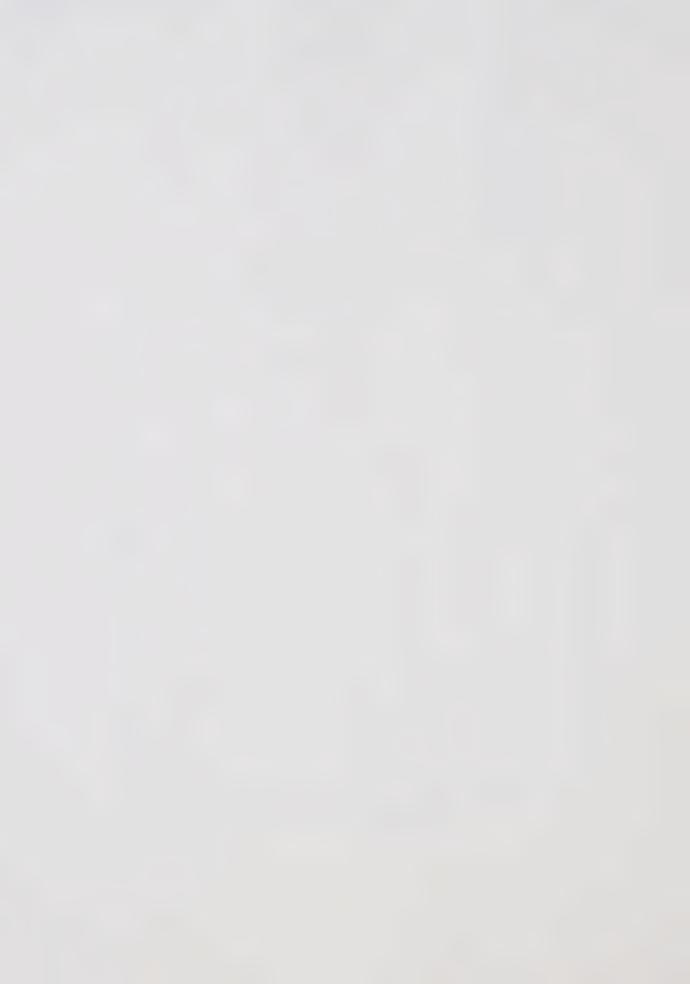


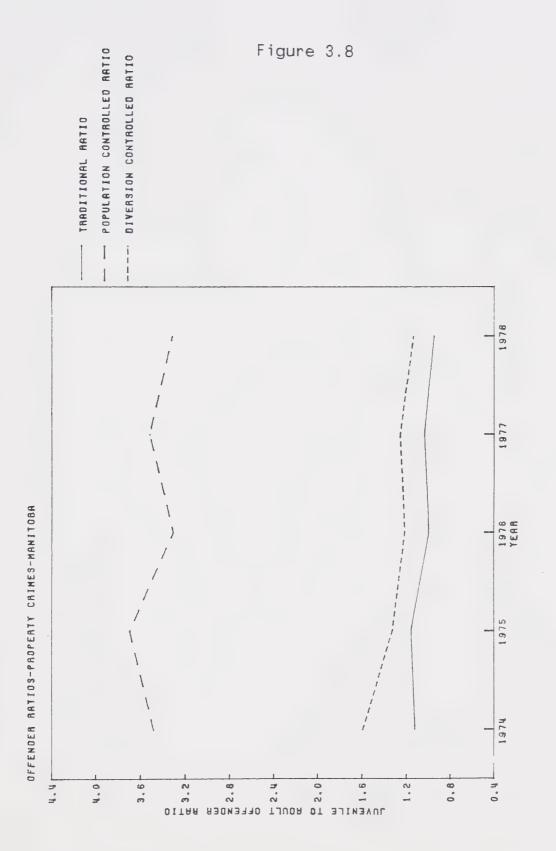


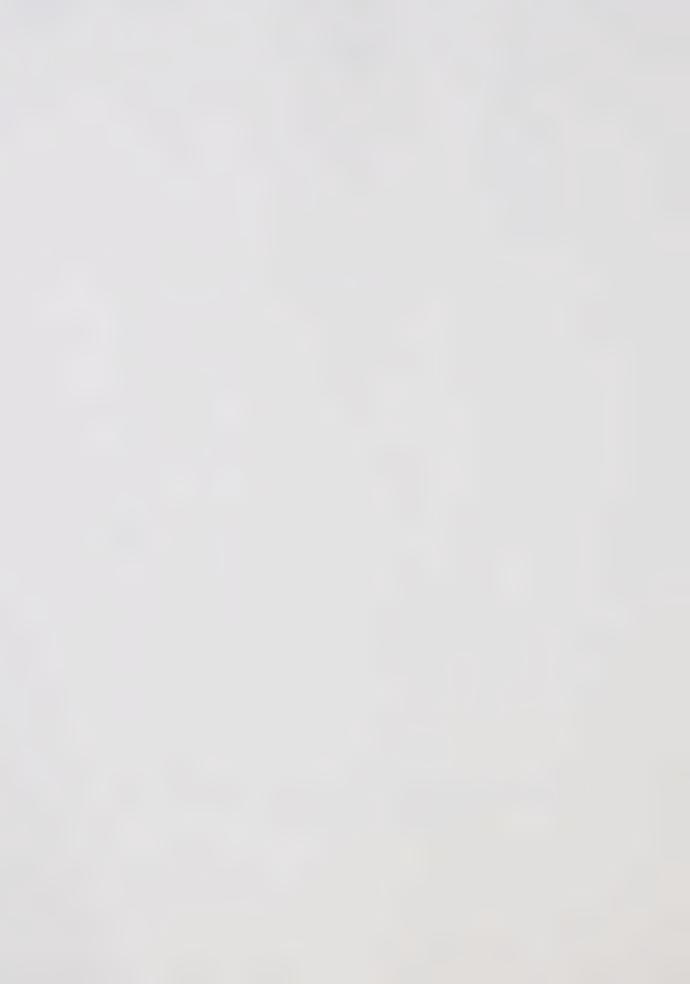


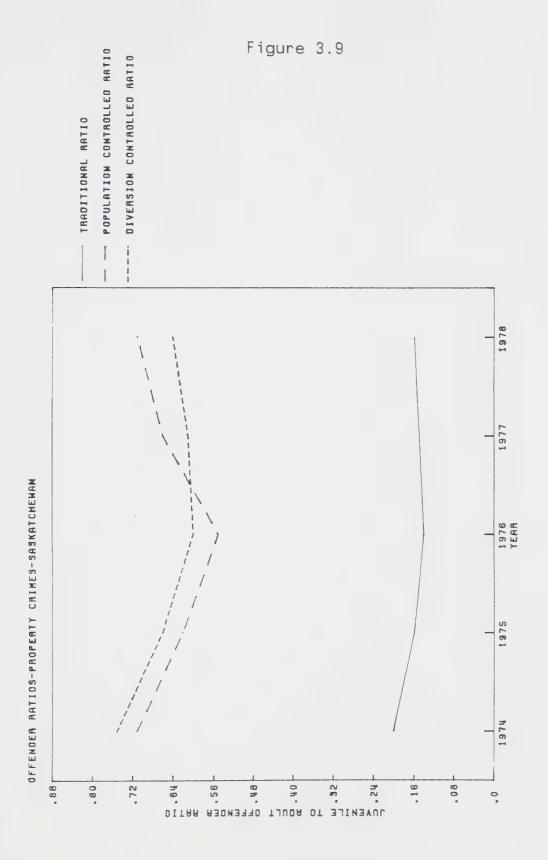


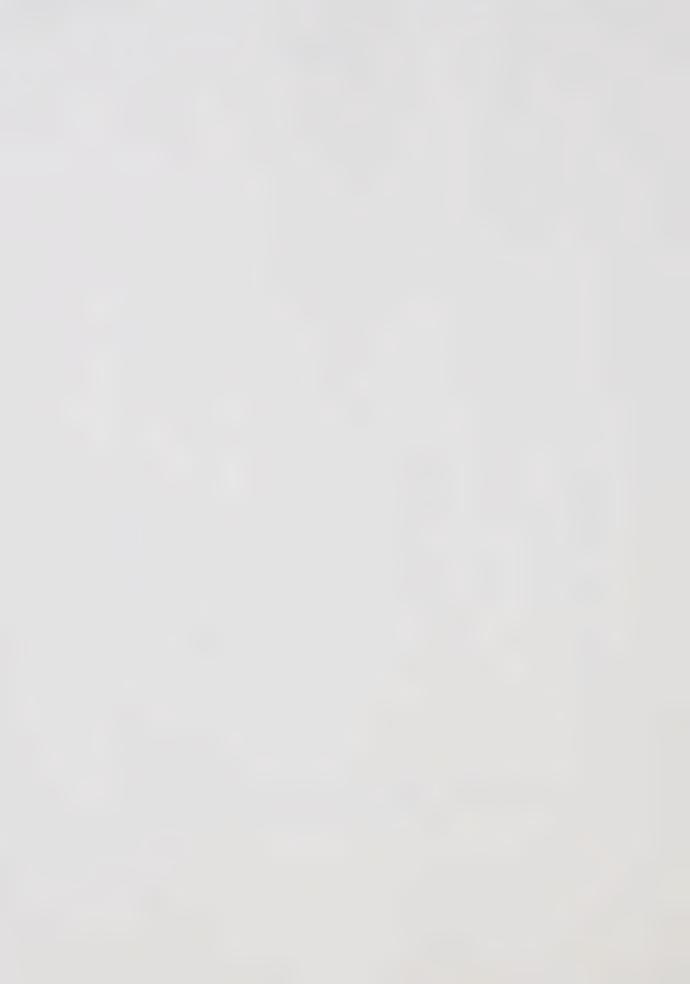


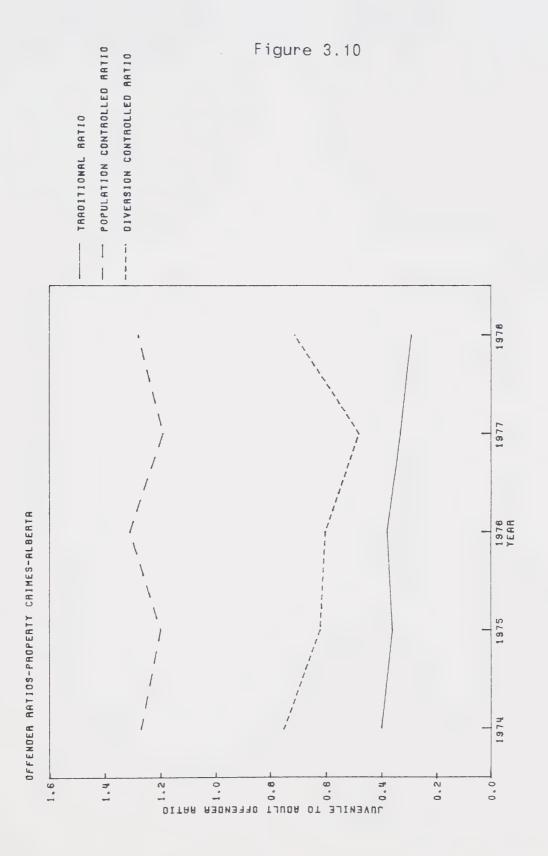


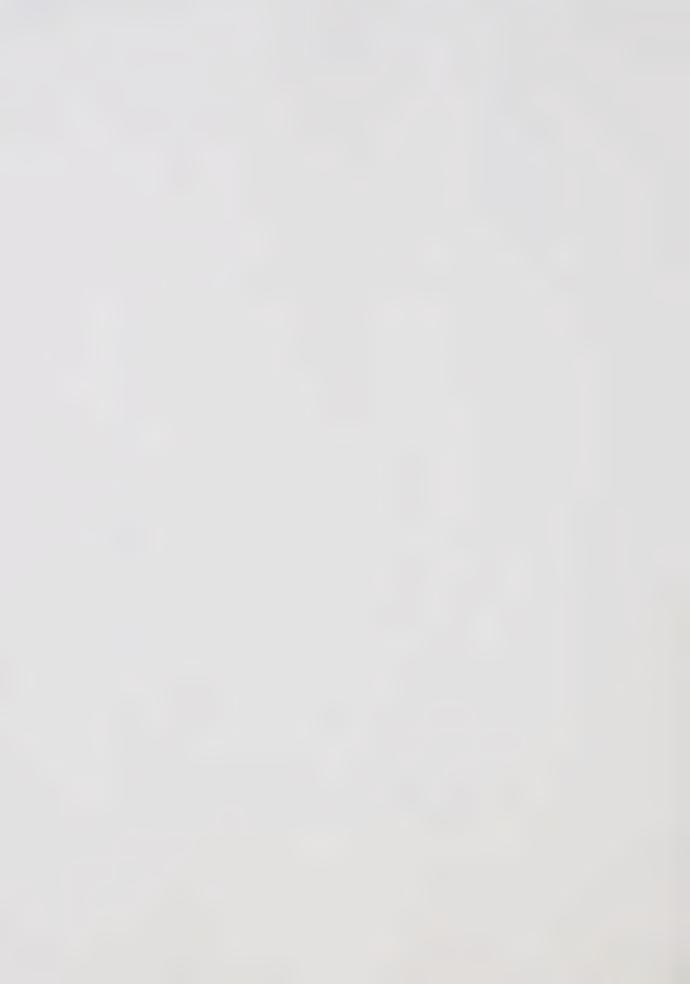


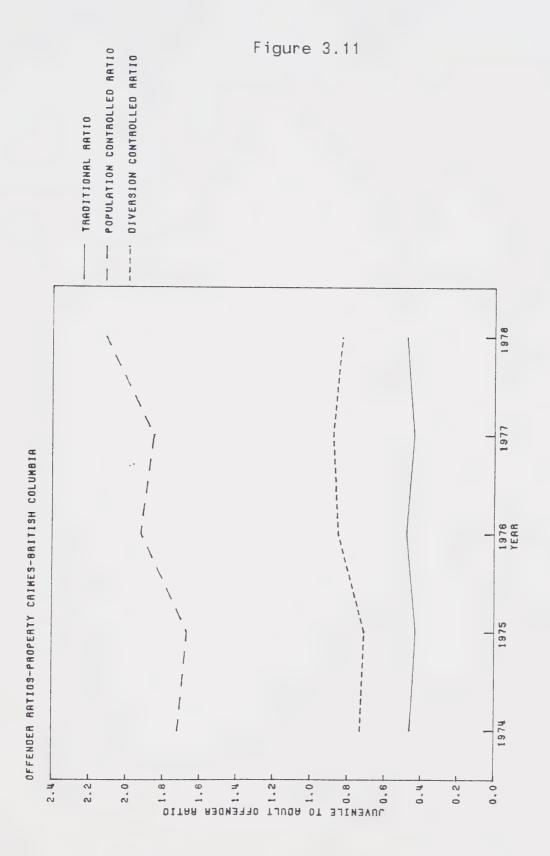


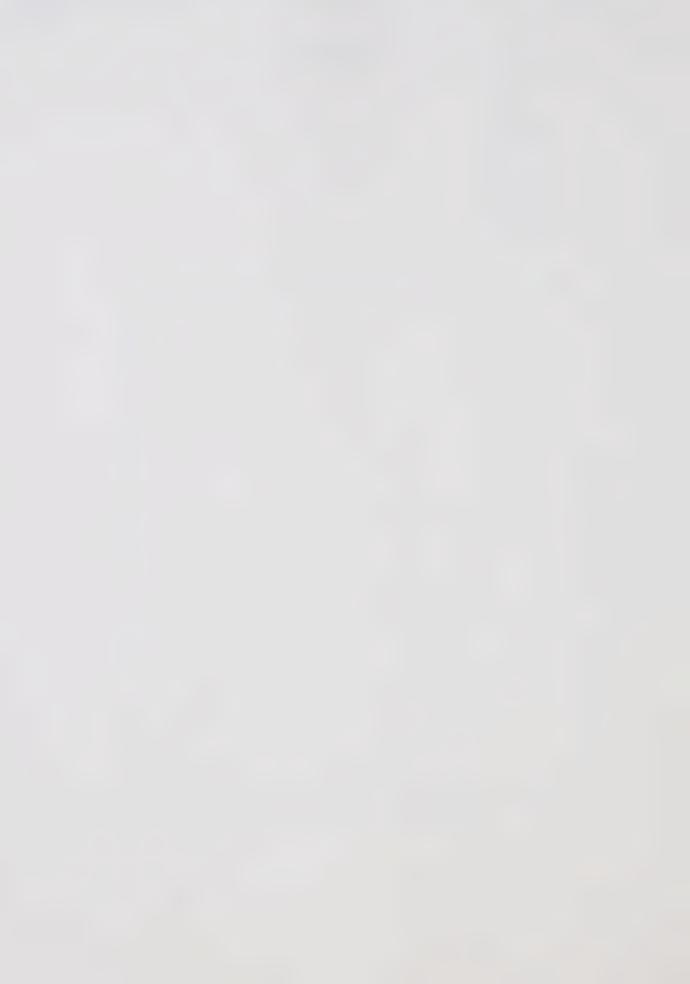


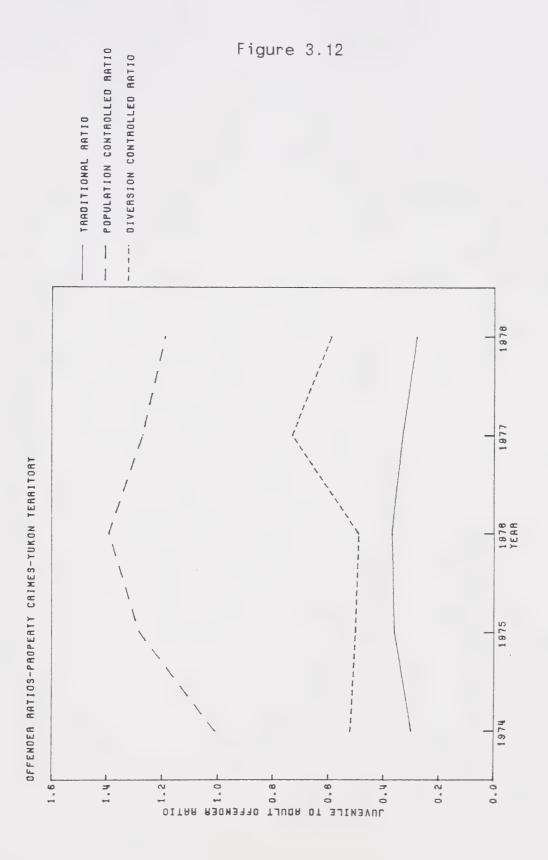




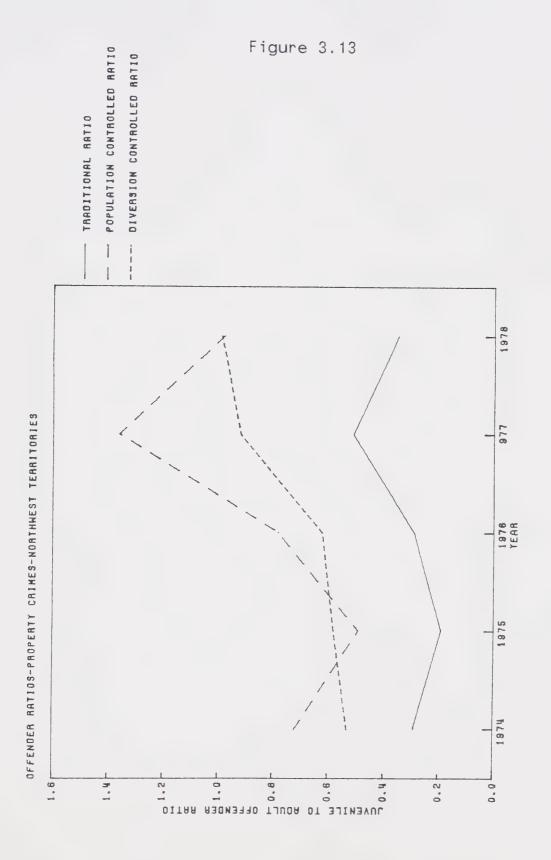












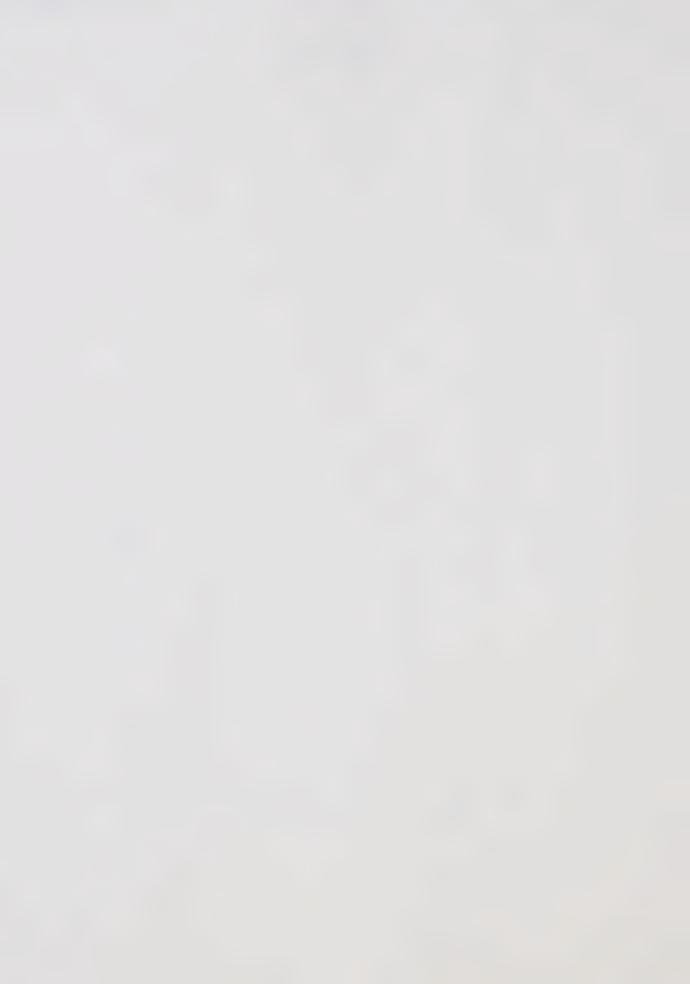
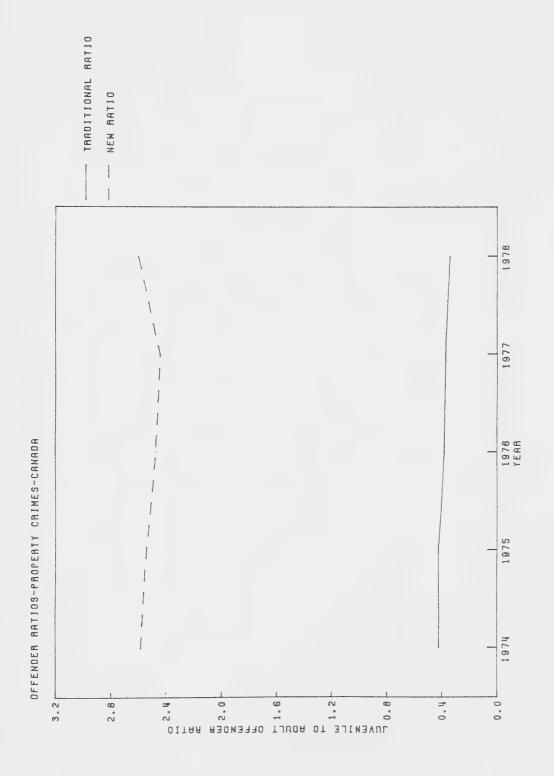


Figure 3.14



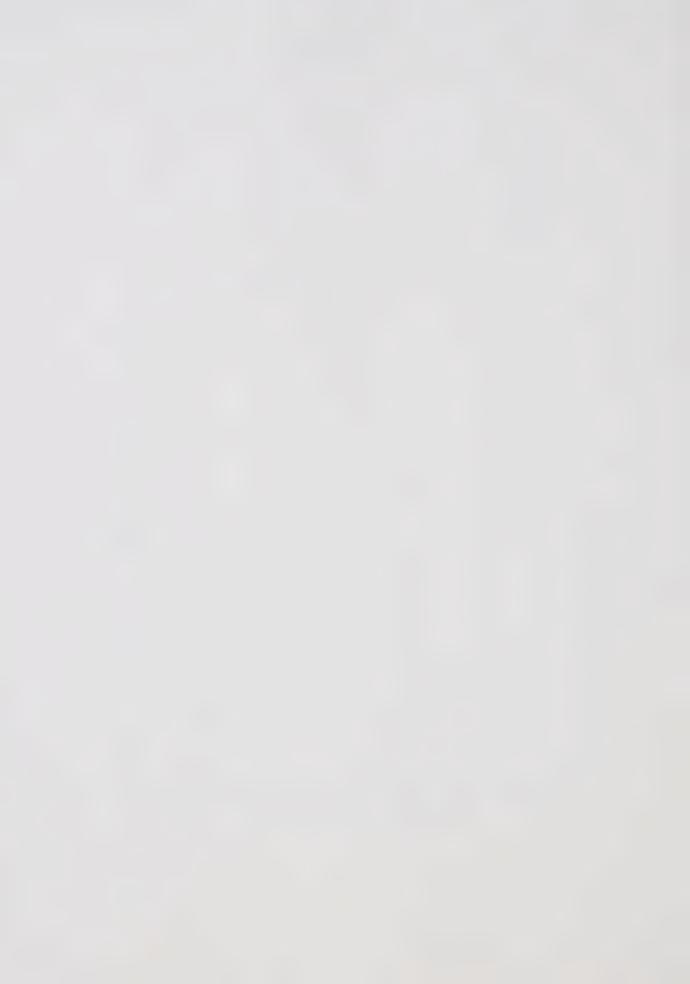
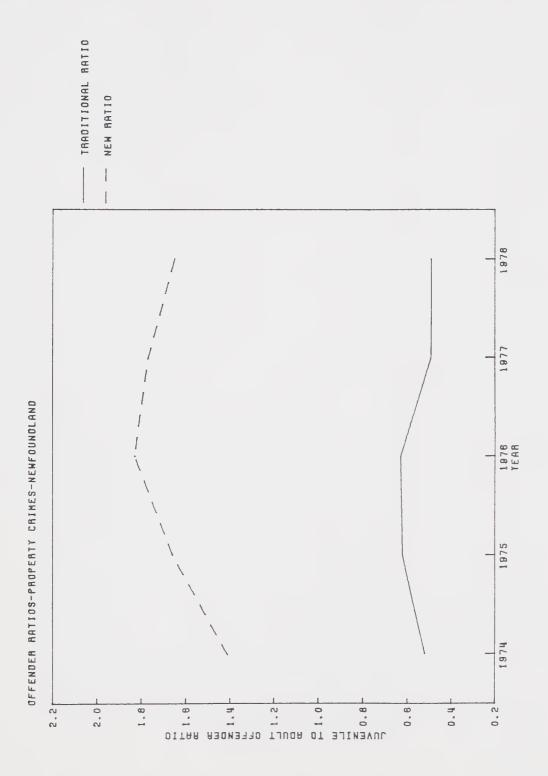


Figure 3.15



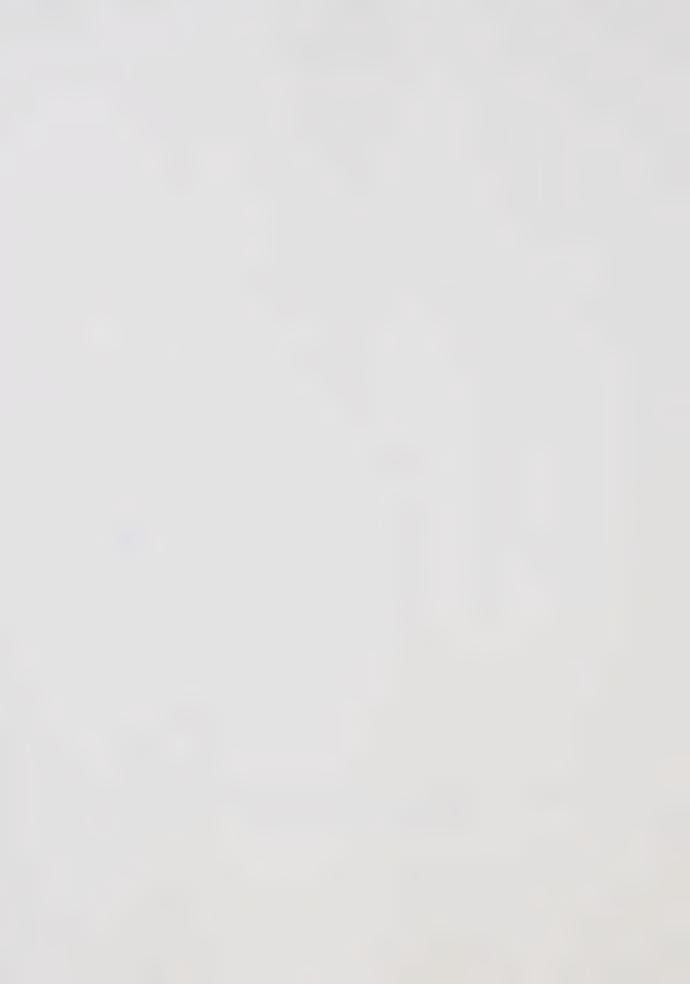
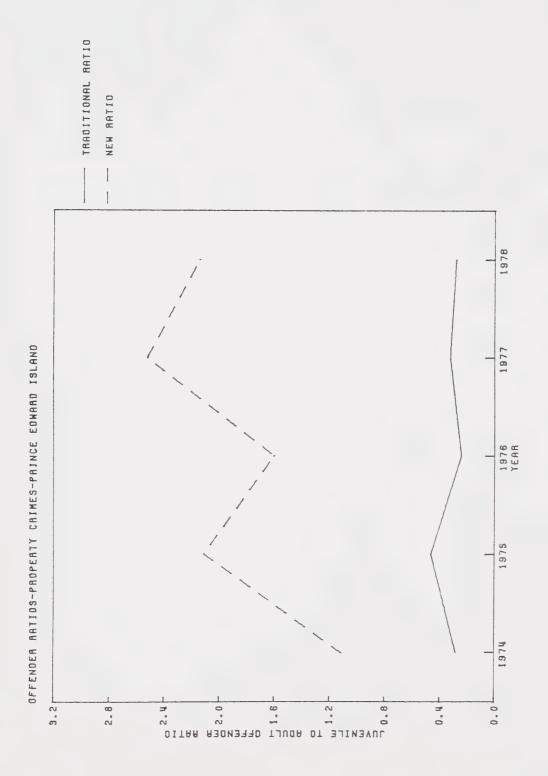


Figure 3.16



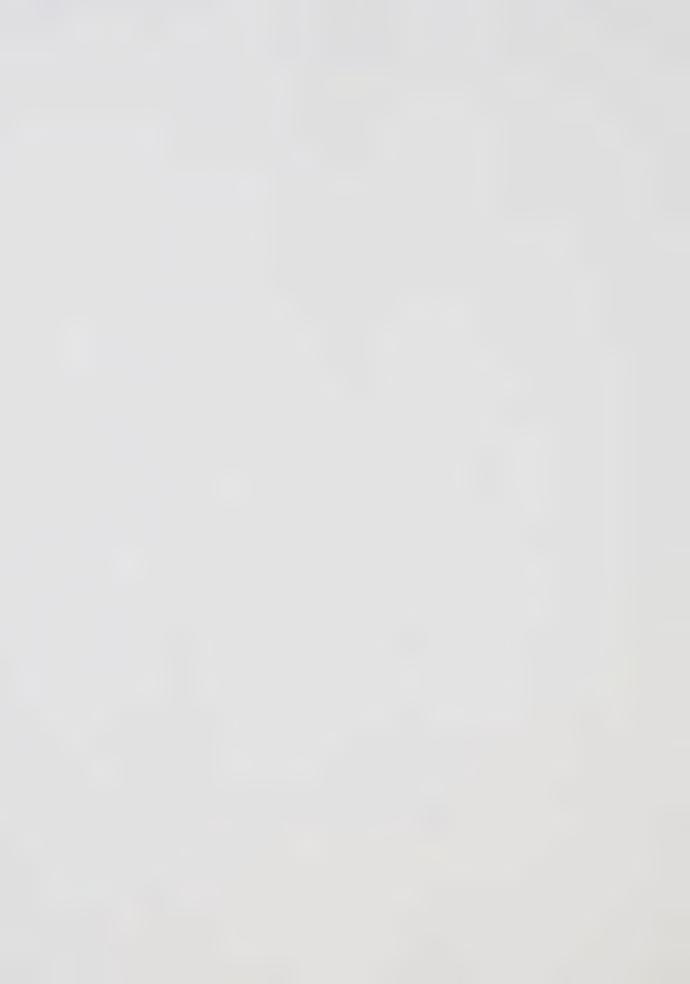
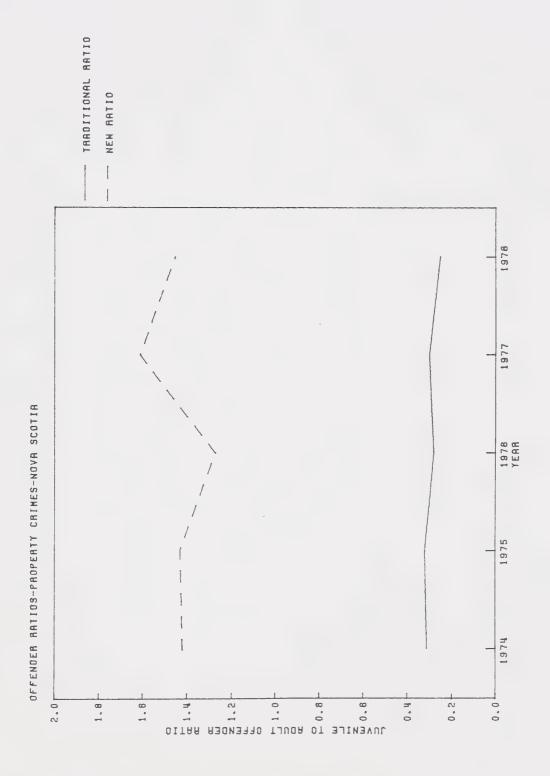


Figure 3.17



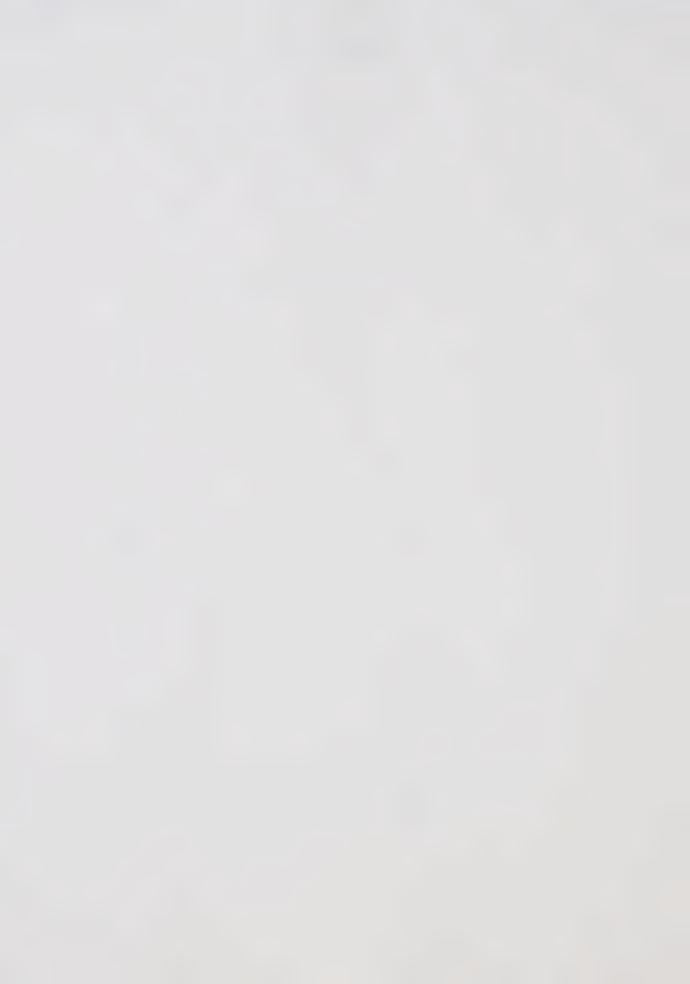
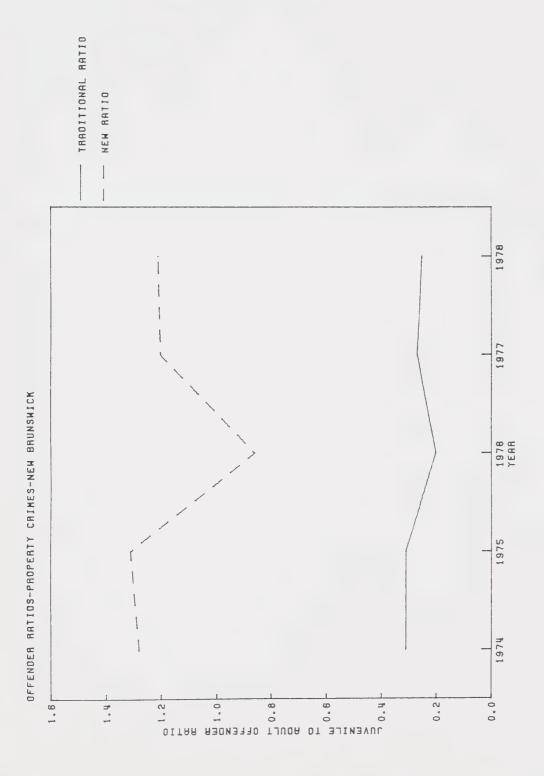


Figure 3.18



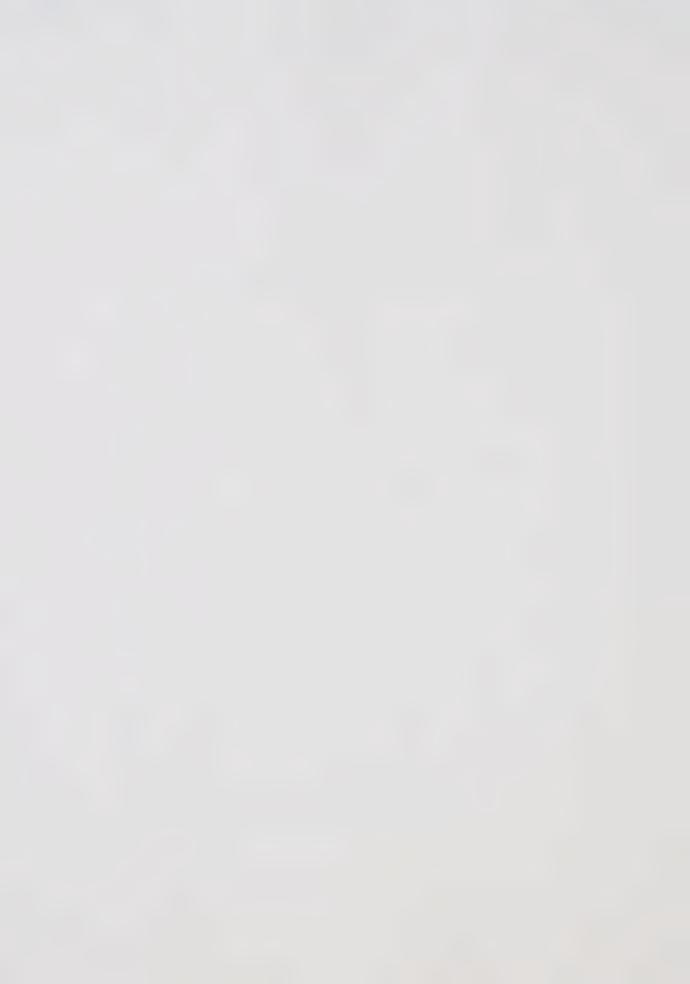
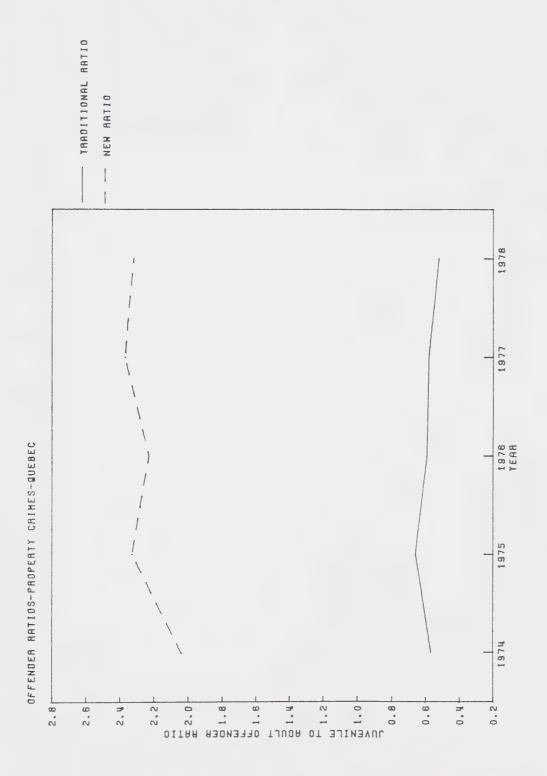


Figure 3.19



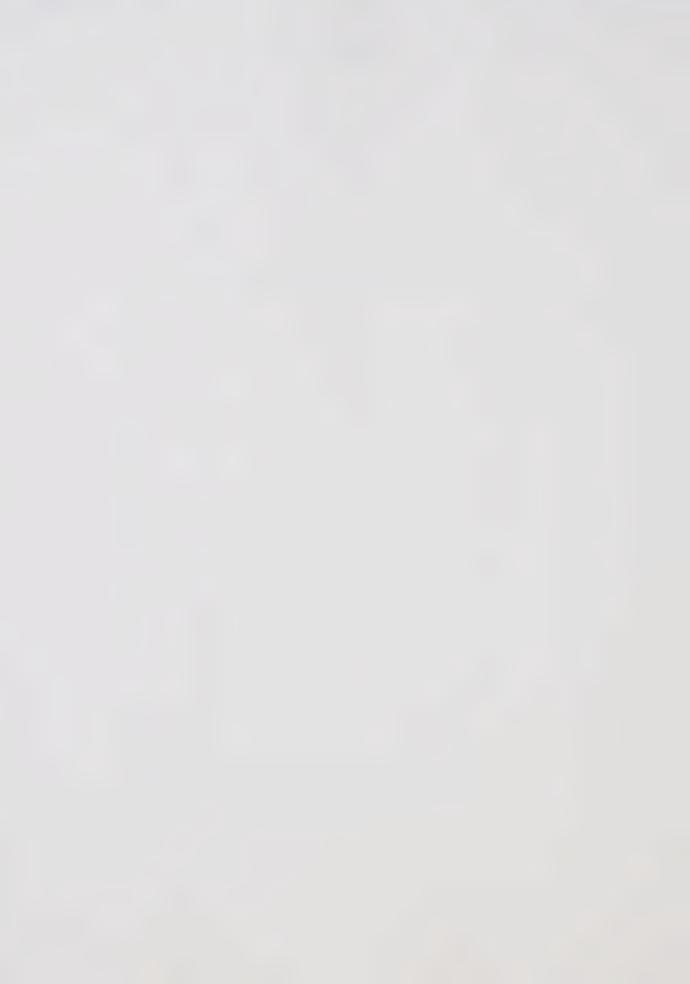
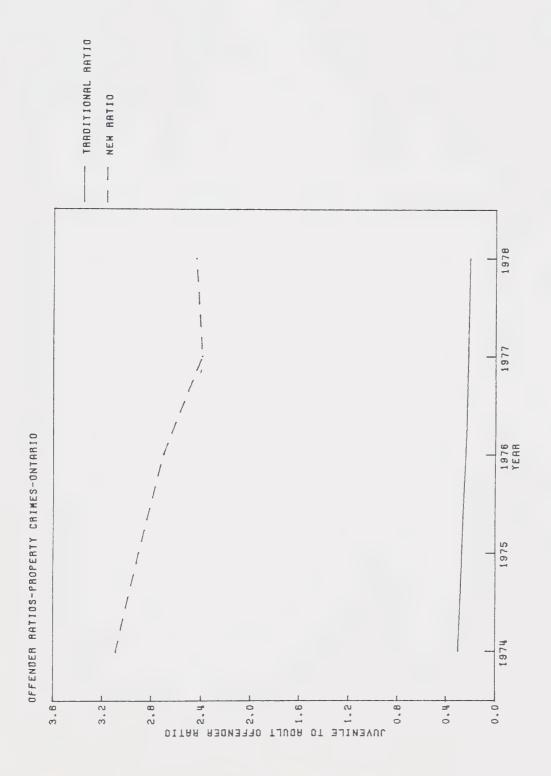


Figure 3.20



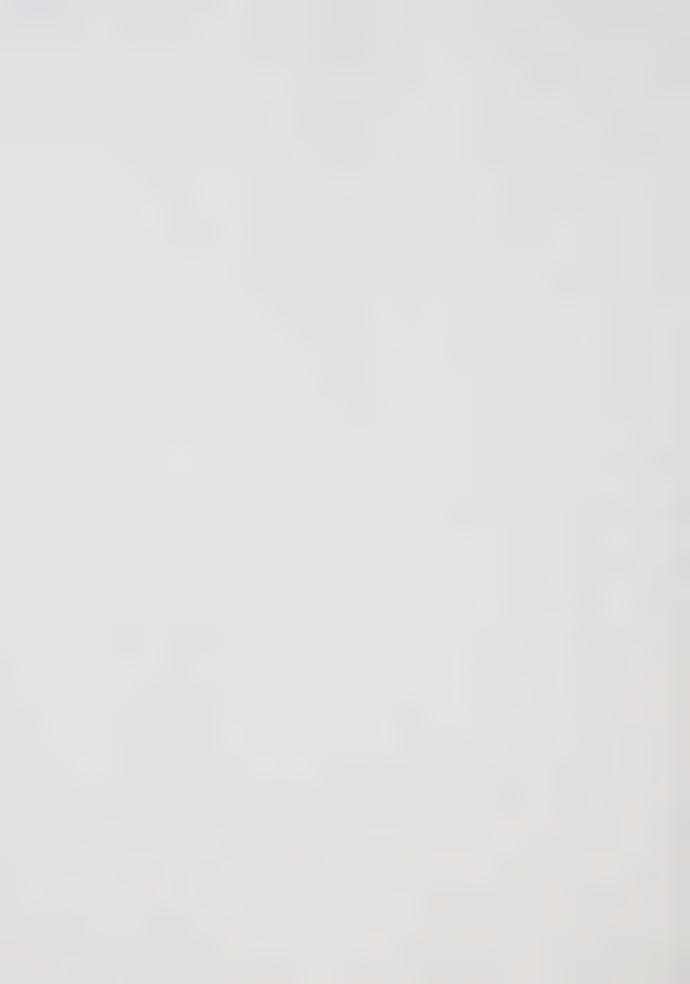
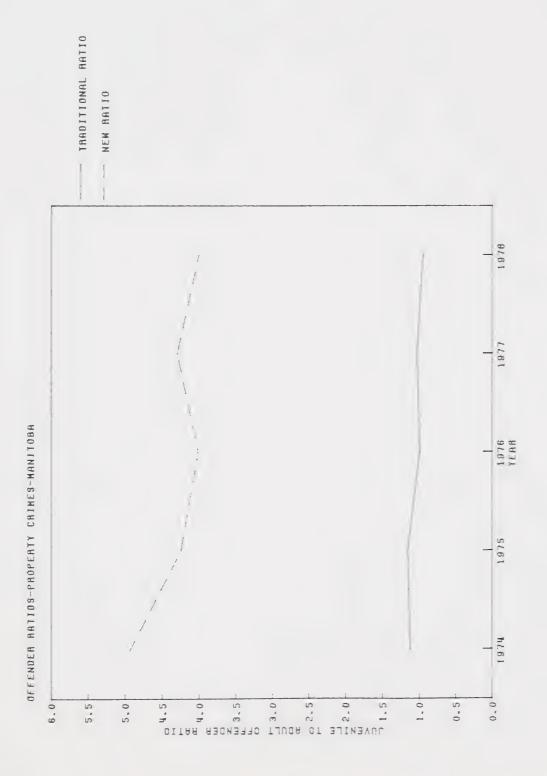


Figure 3.21



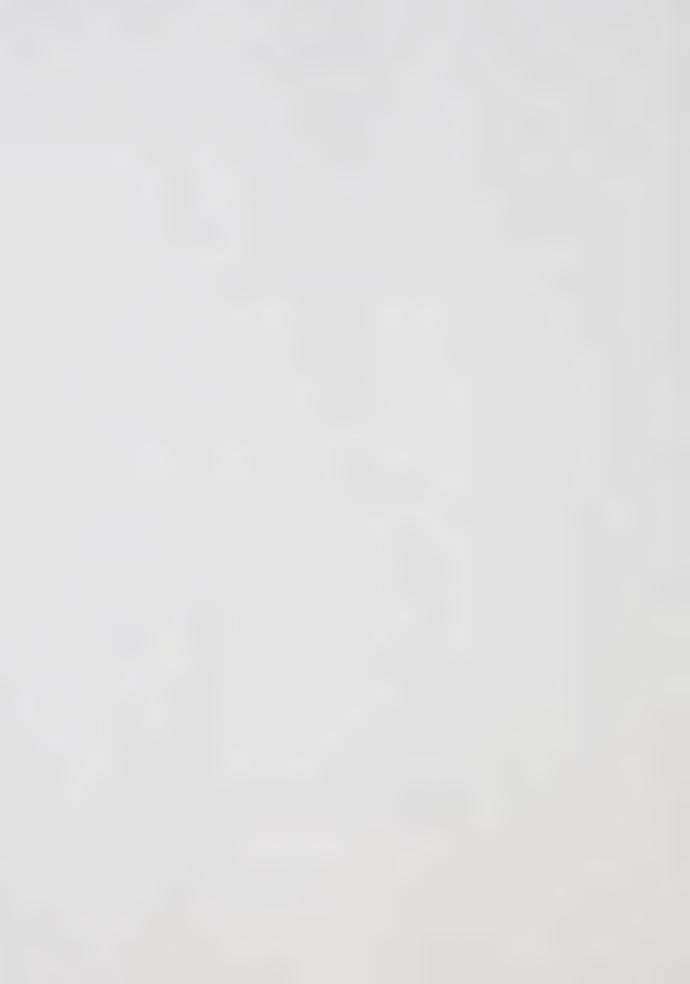


Figure 3.22

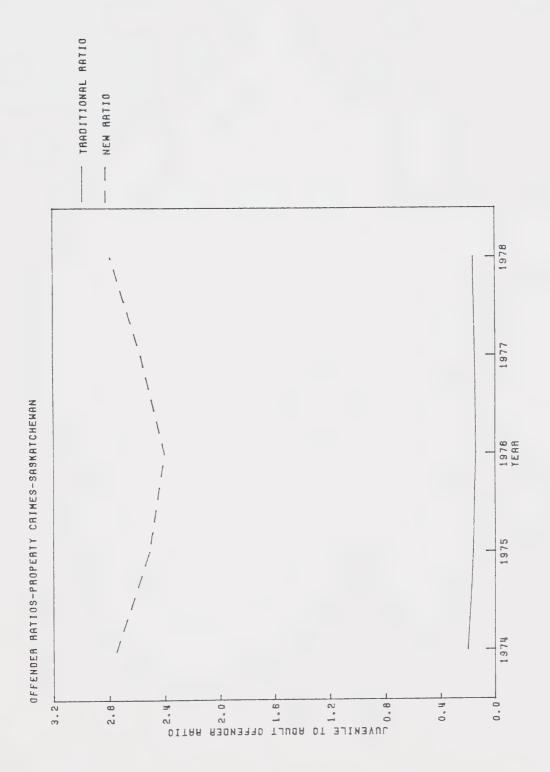
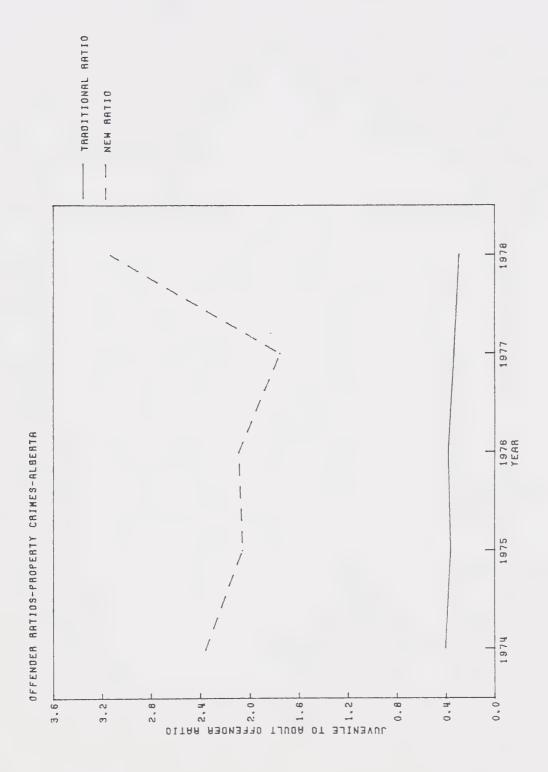




Figure 3.23



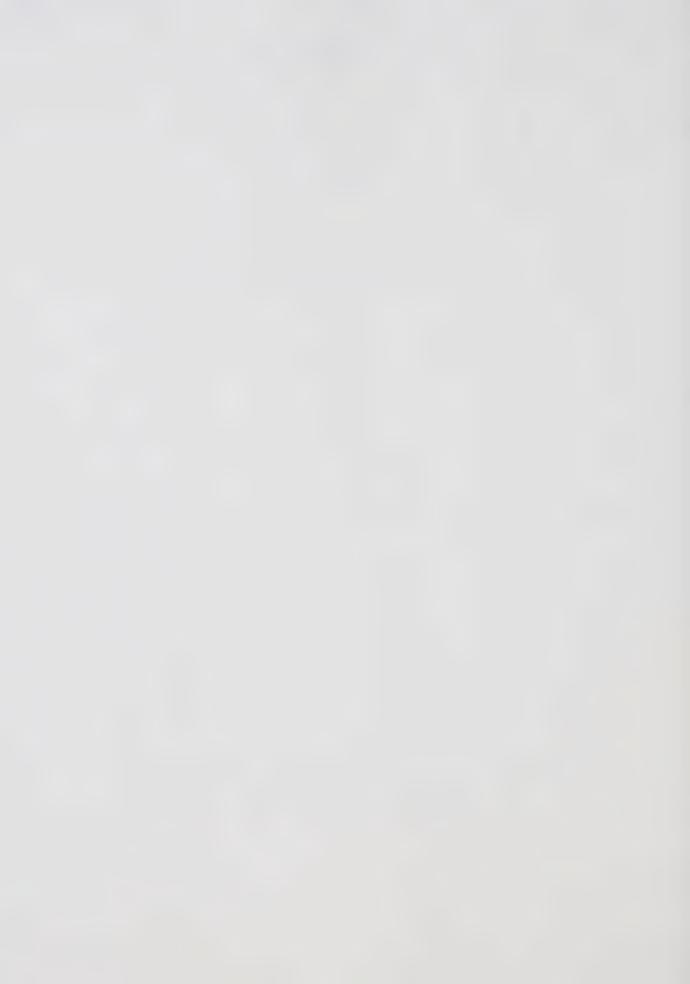
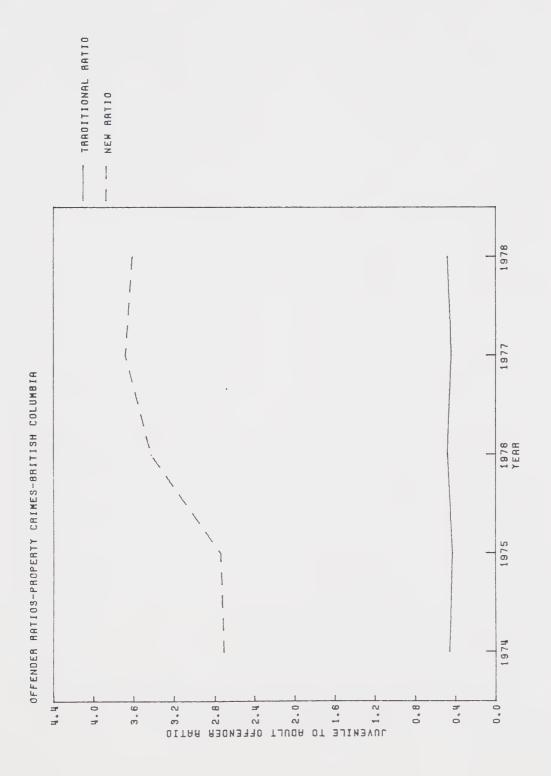


Figure 3.24



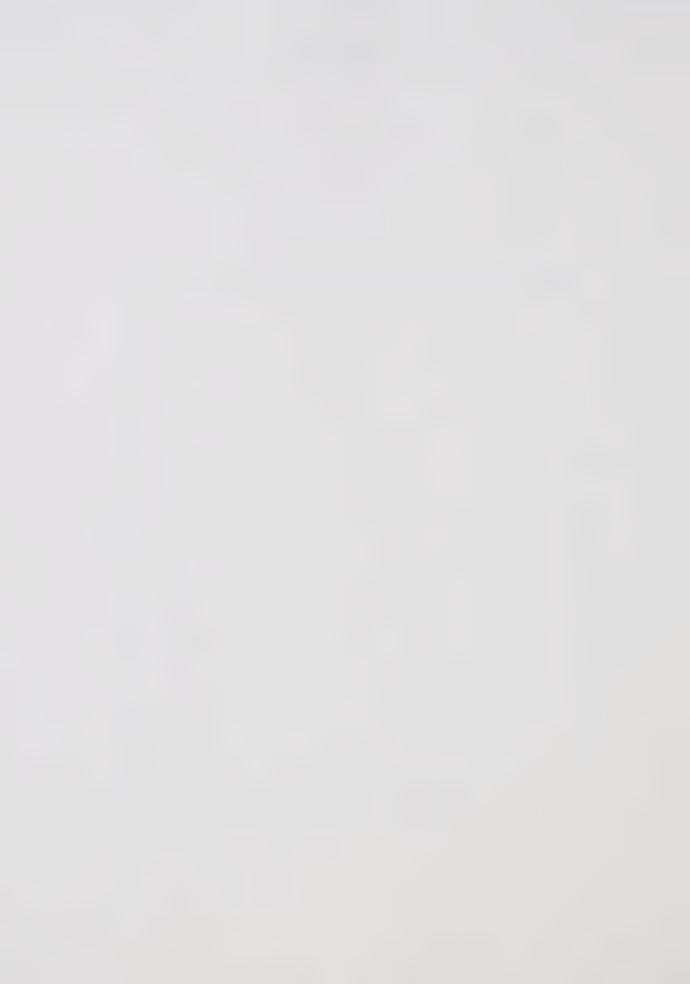
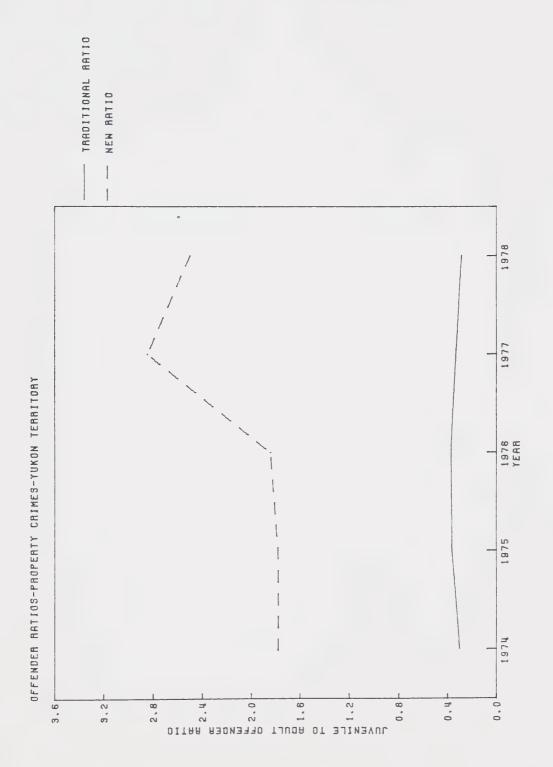


Figure 3.25



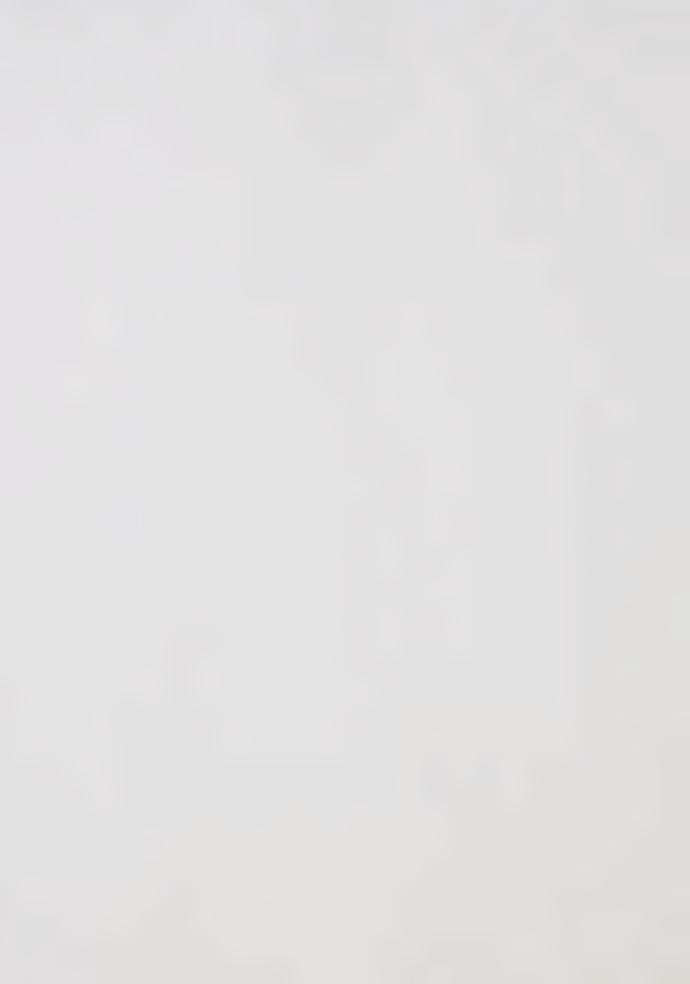
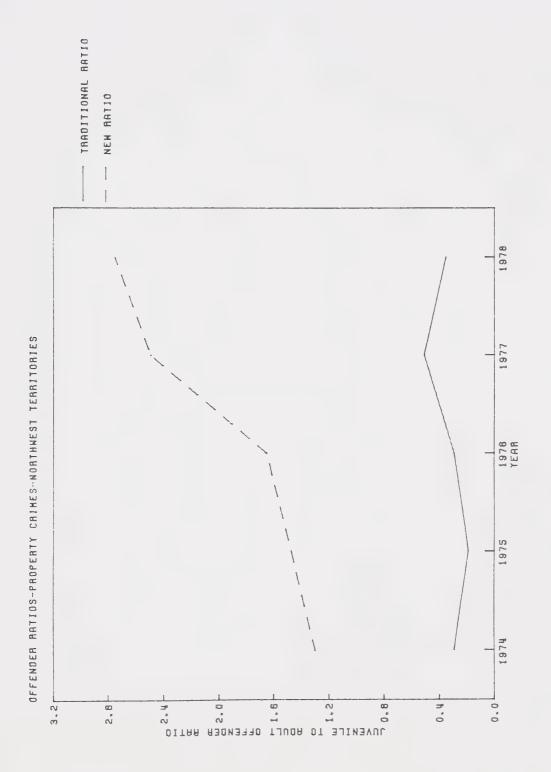
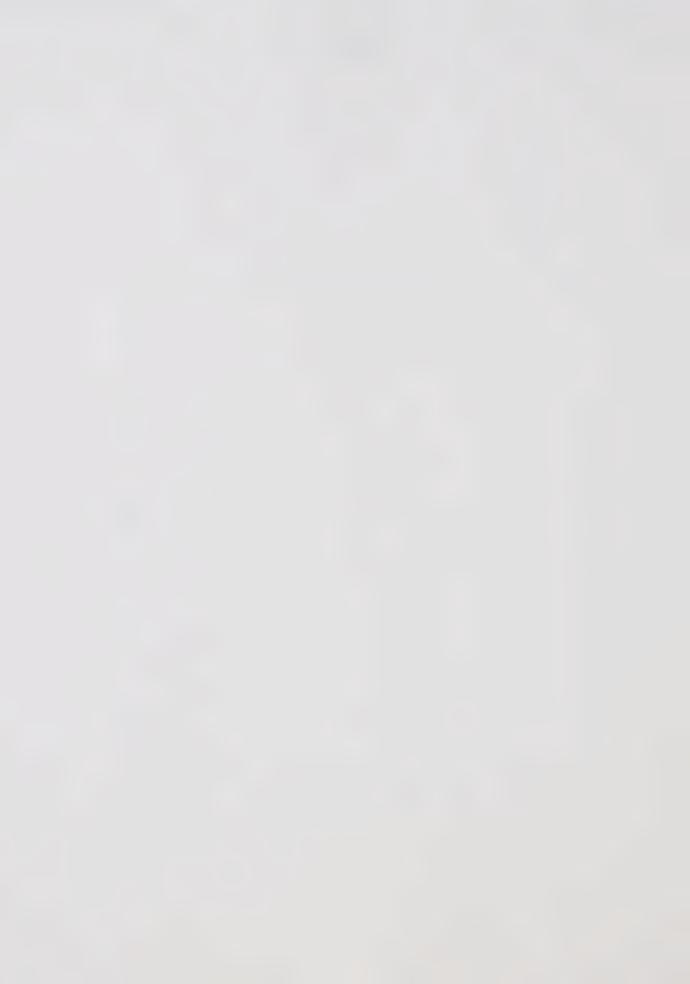


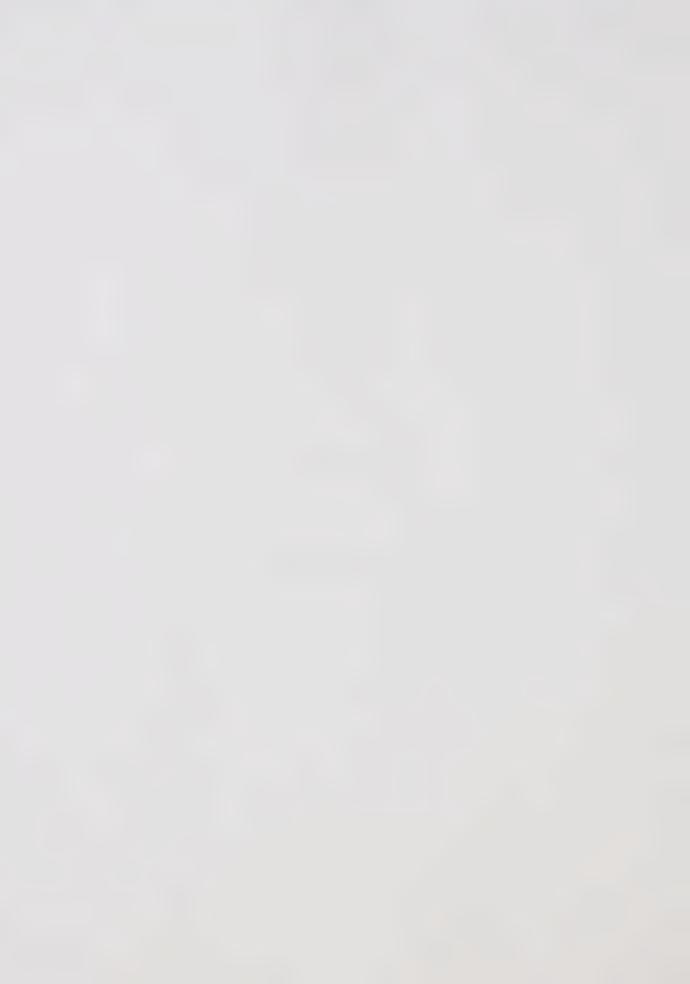
Figure 3.26

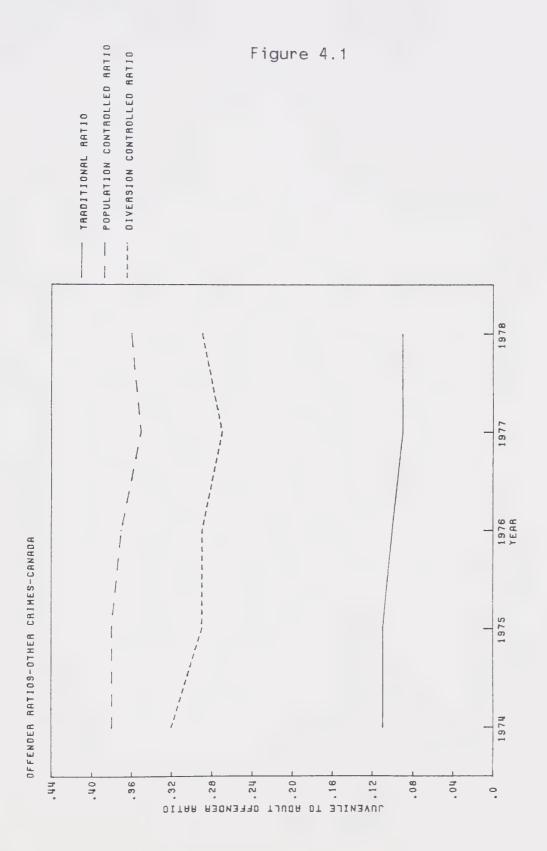


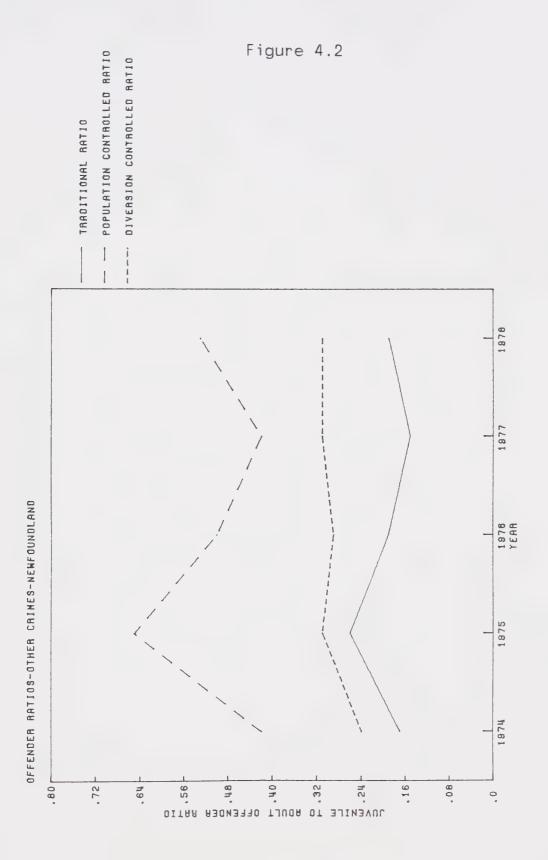


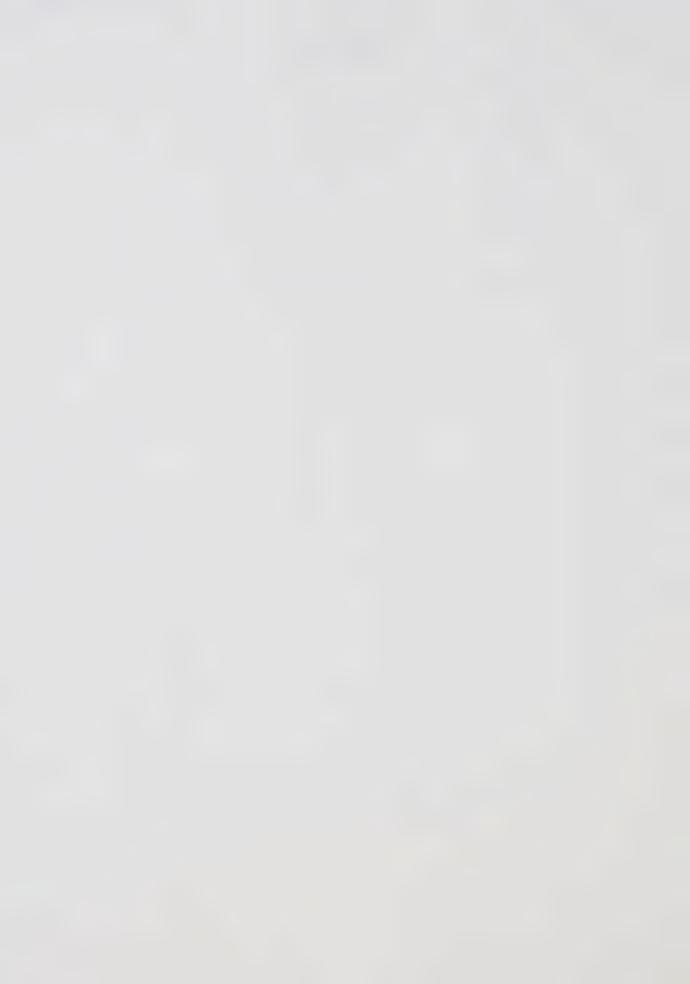
Appendix 4

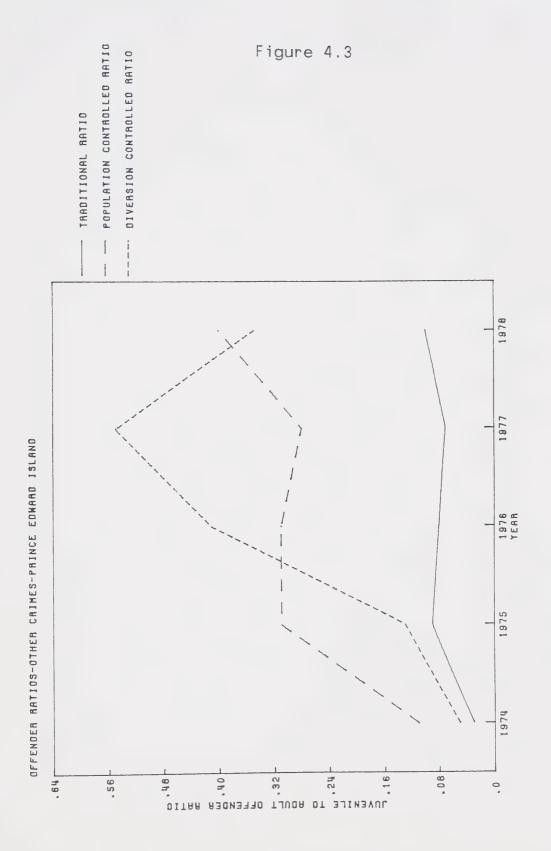
Other Offences

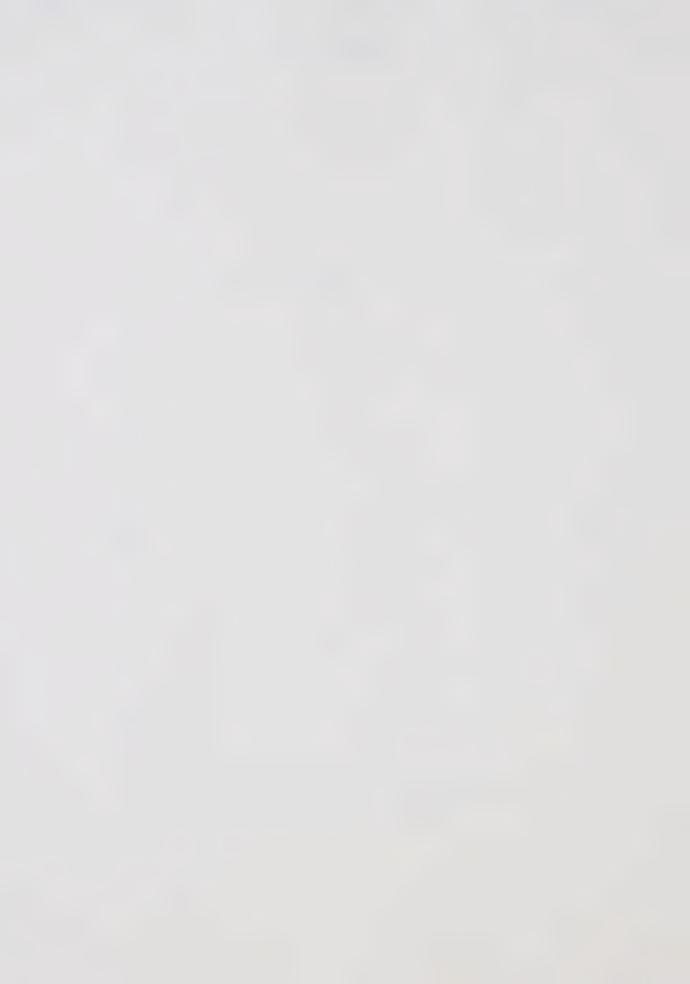


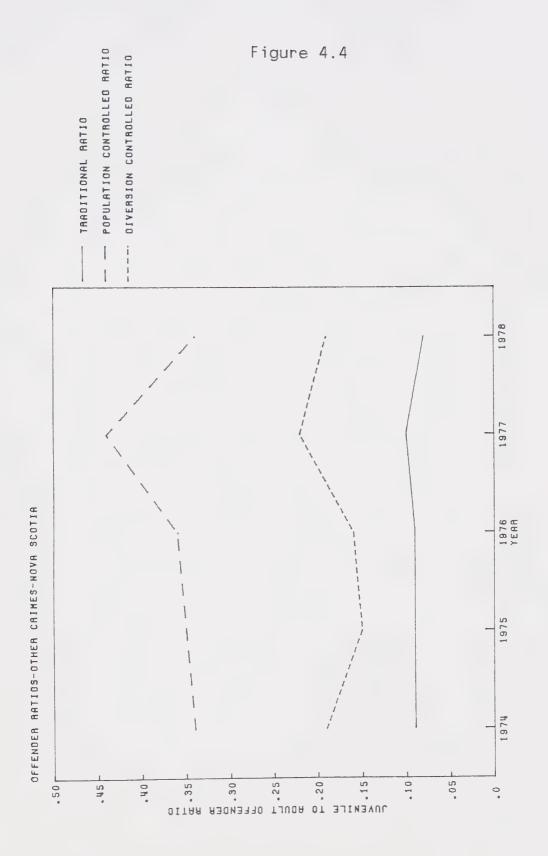


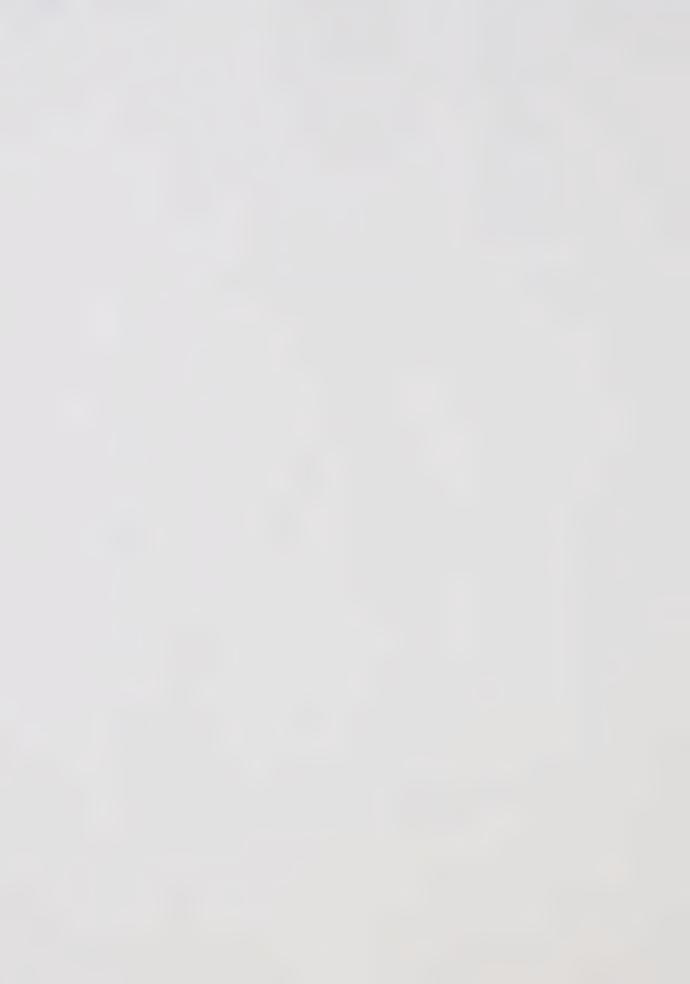


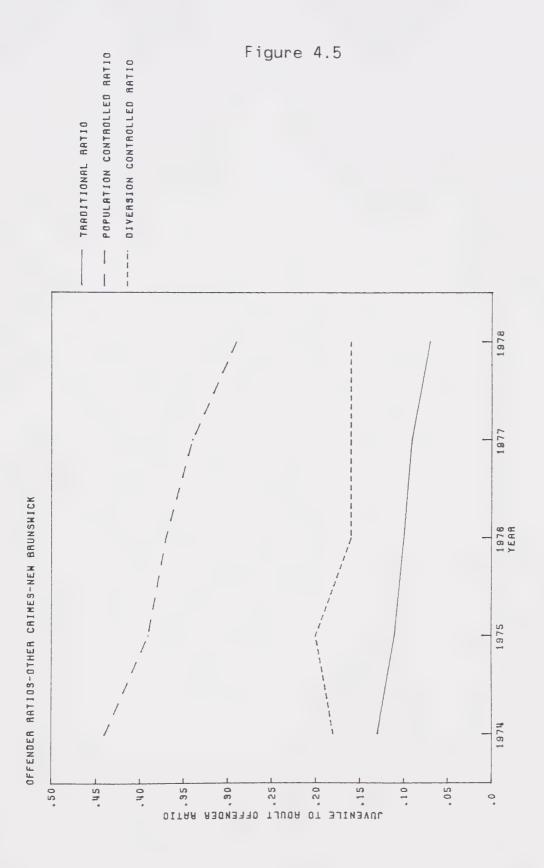


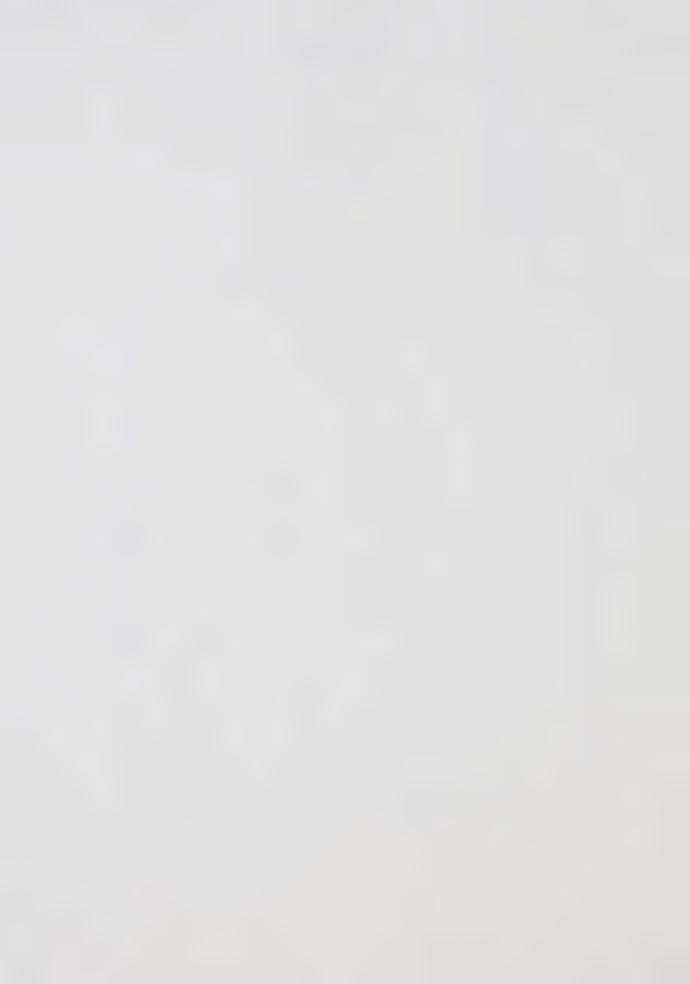


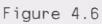


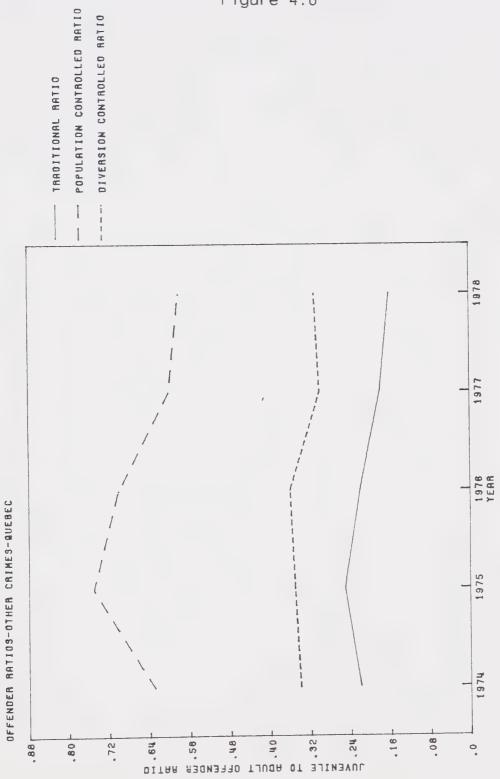


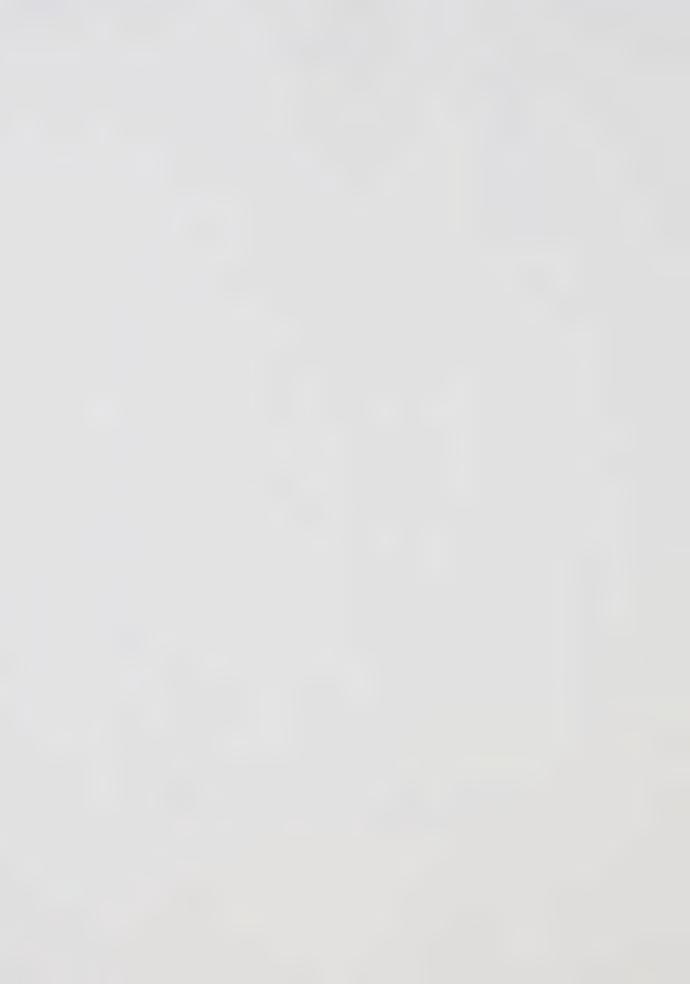


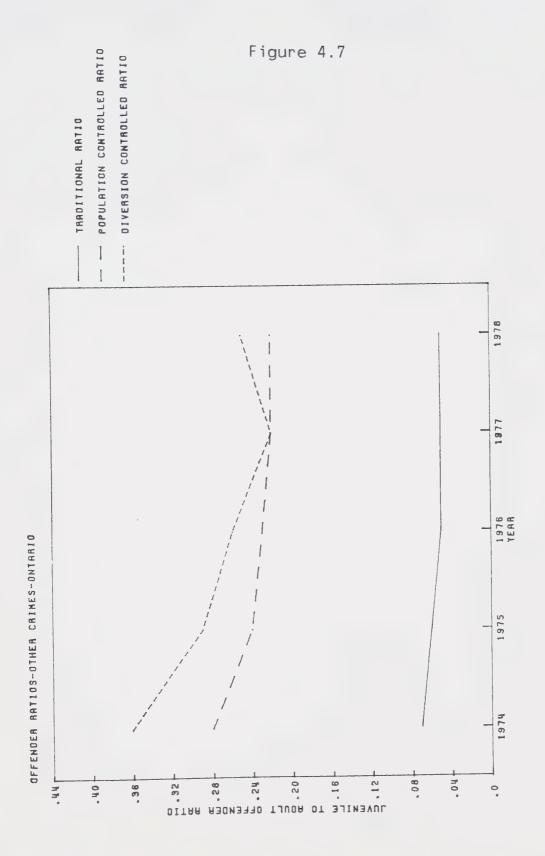












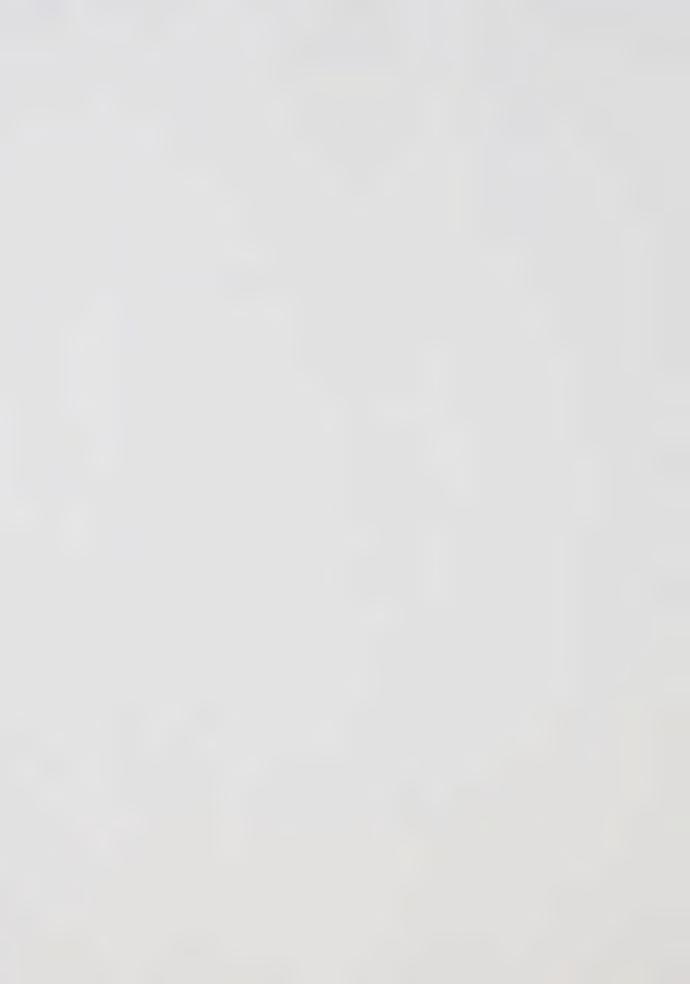
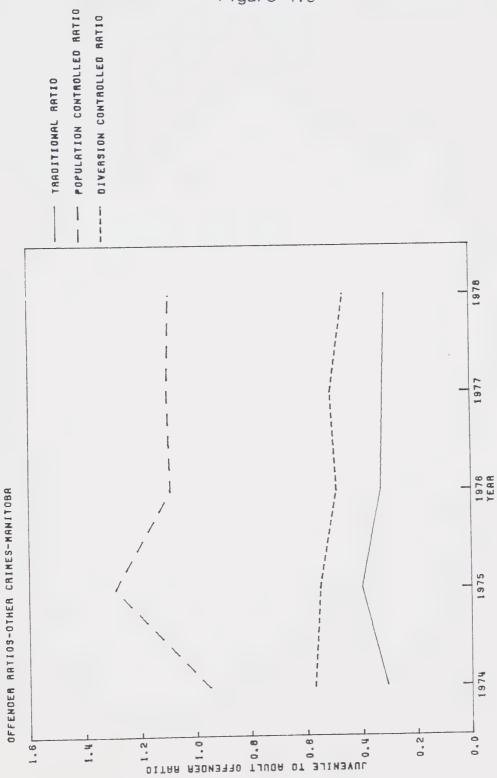
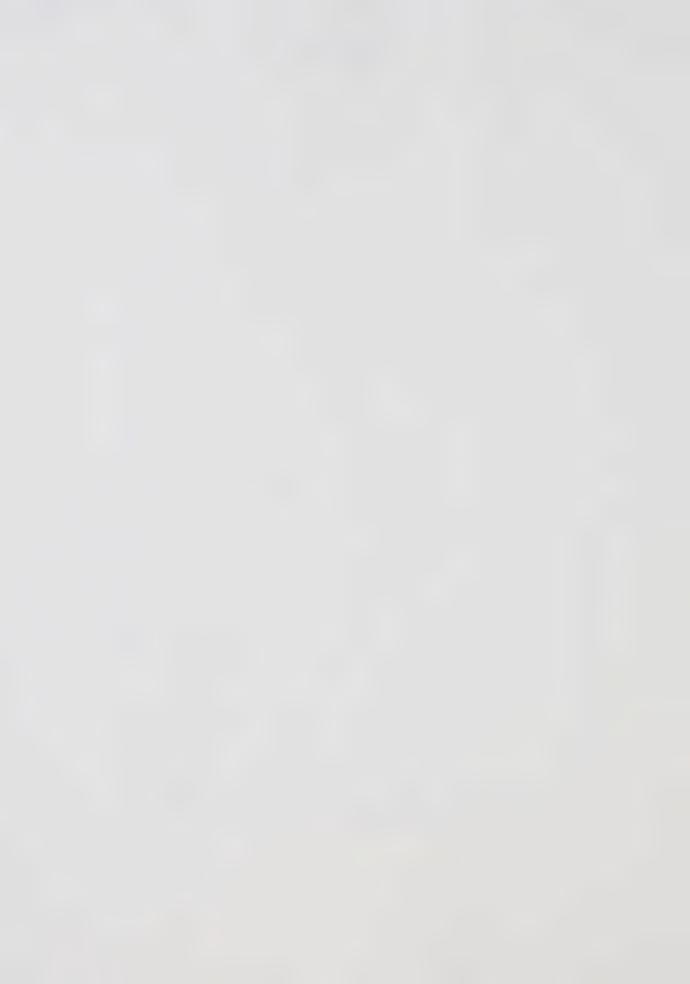
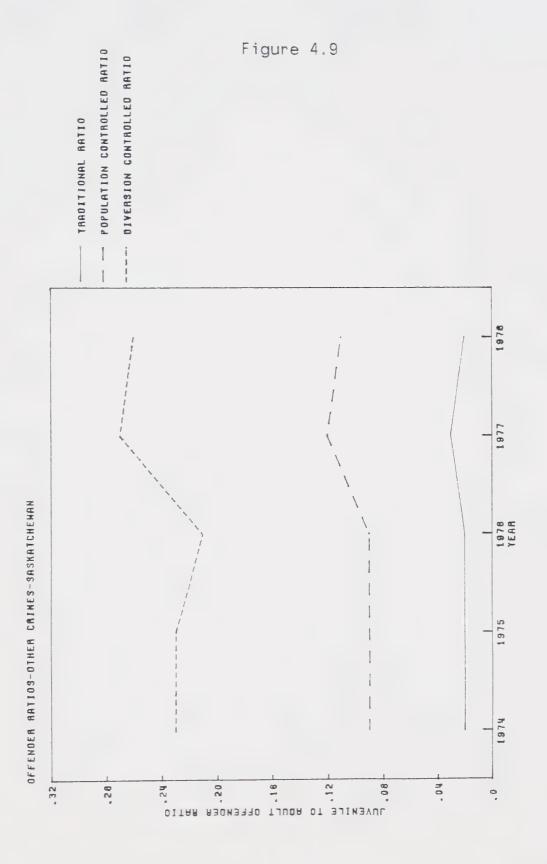
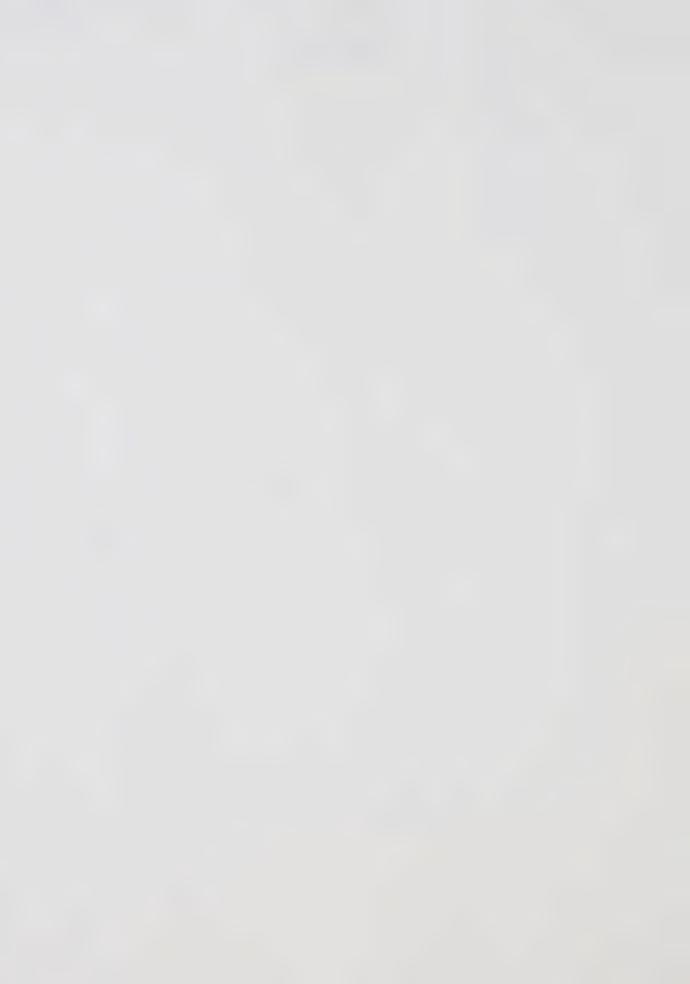


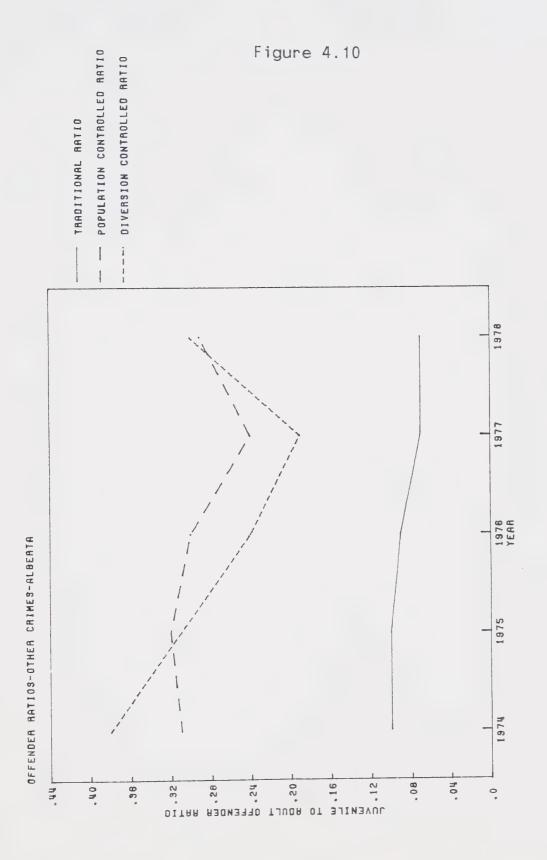
Figure 4.8

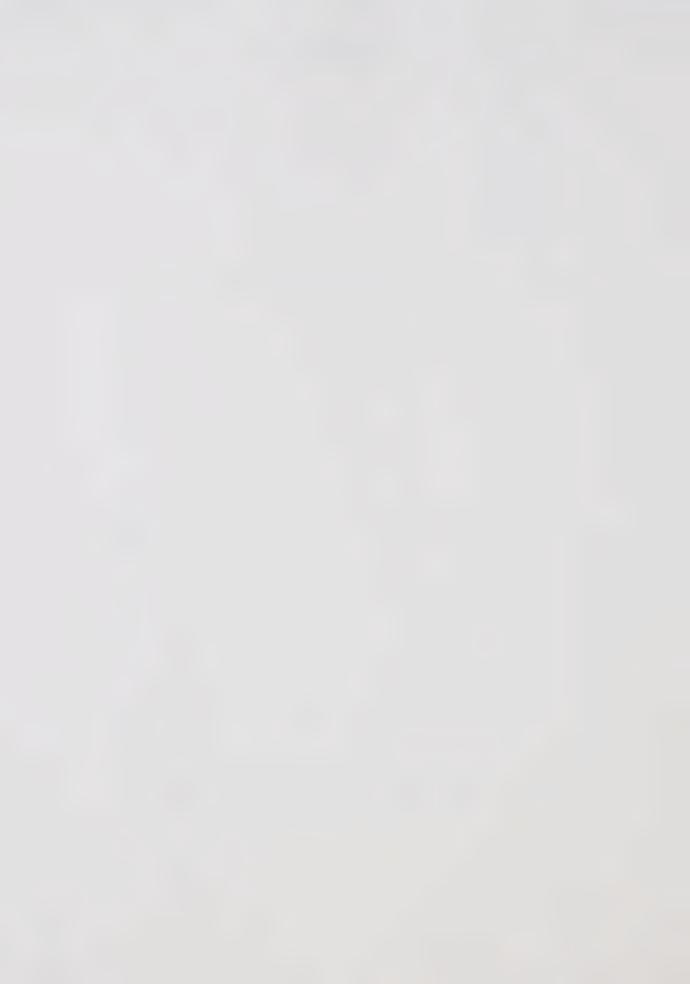


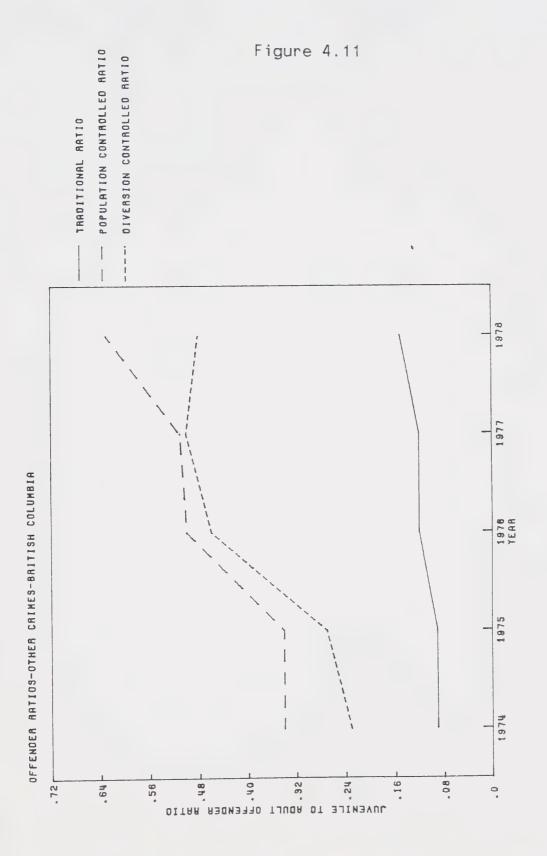


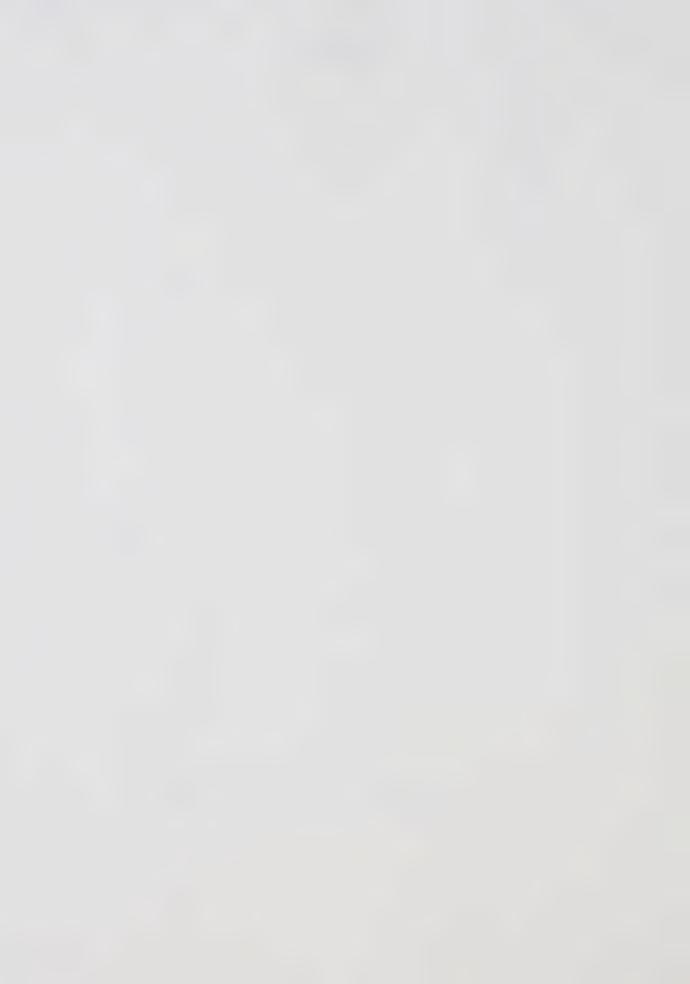


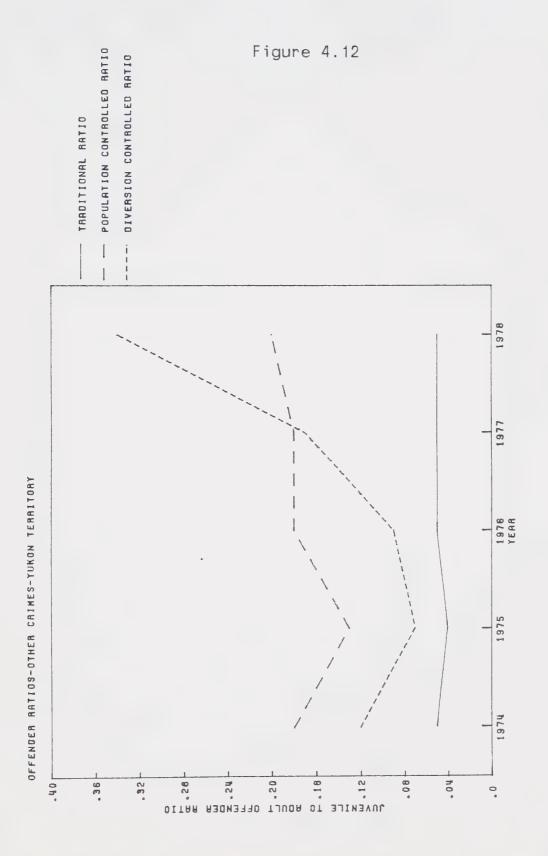


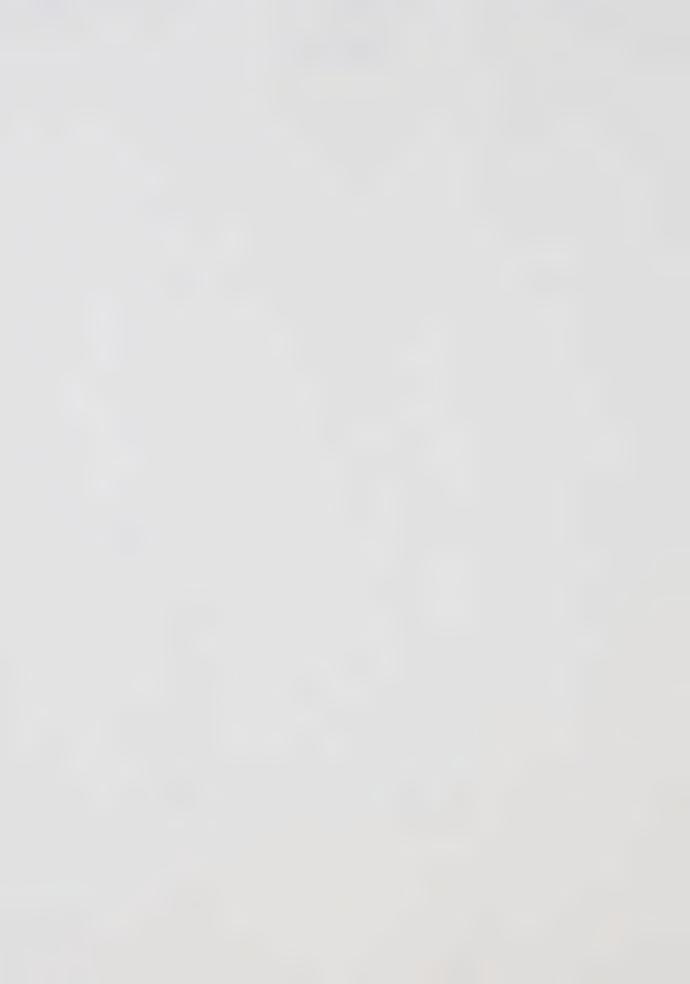


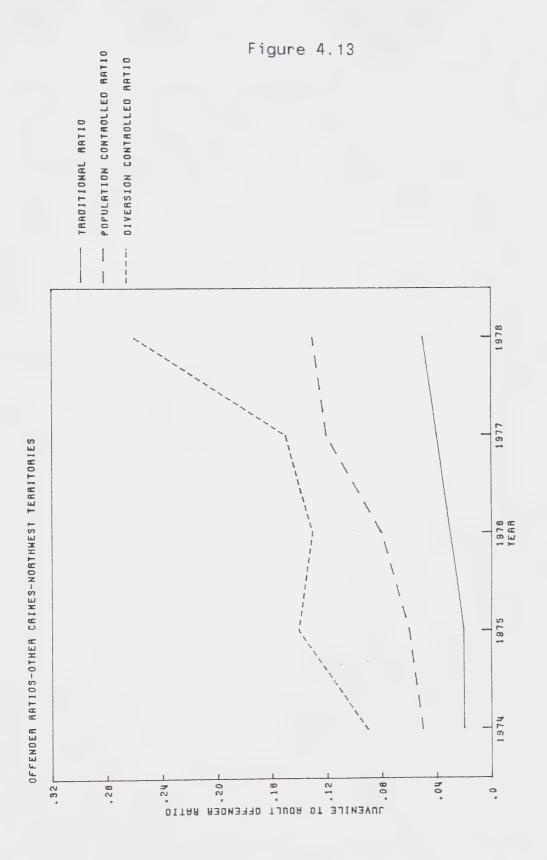












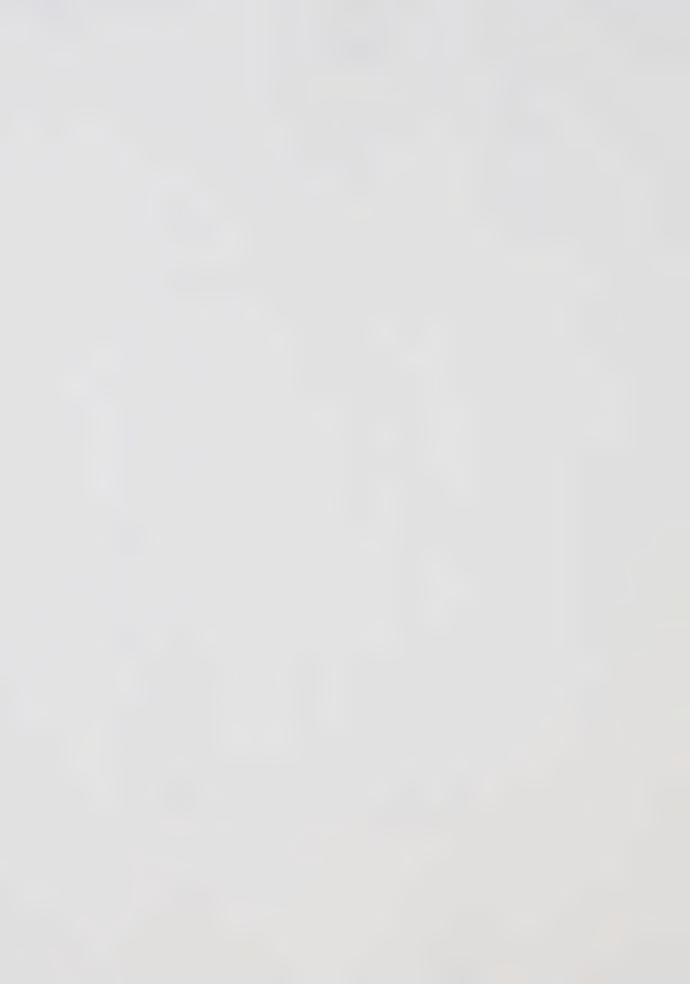


Figure 4.14

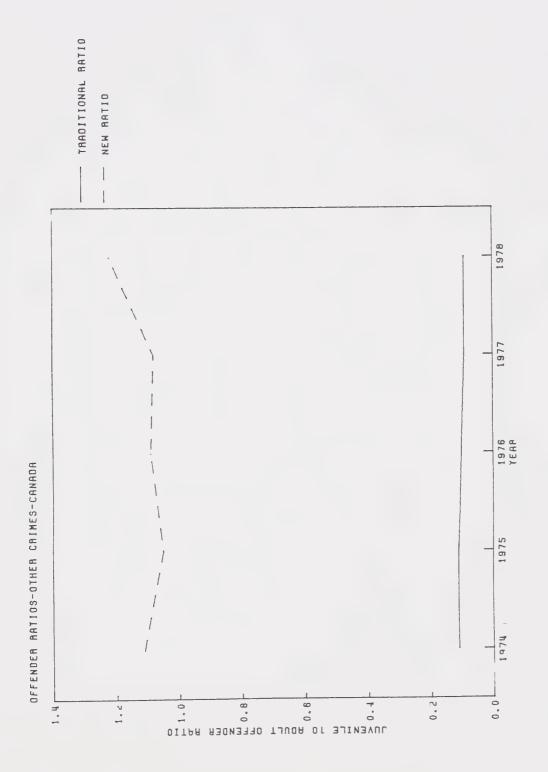
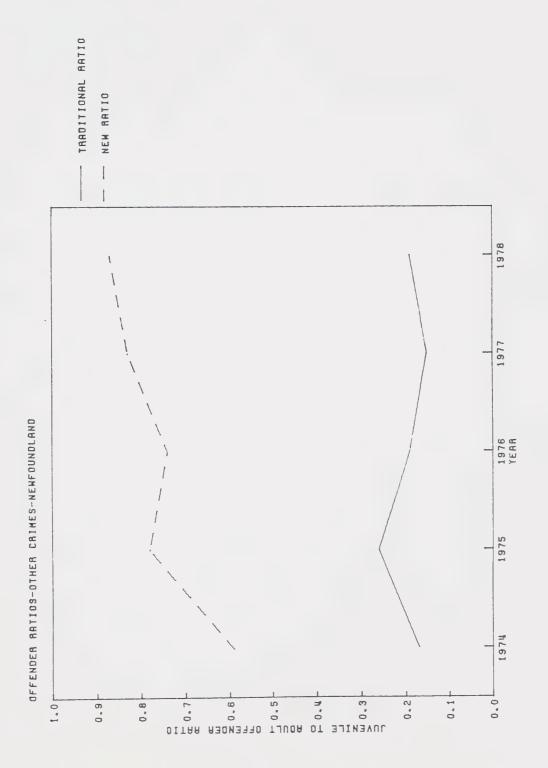




Figure 4.15



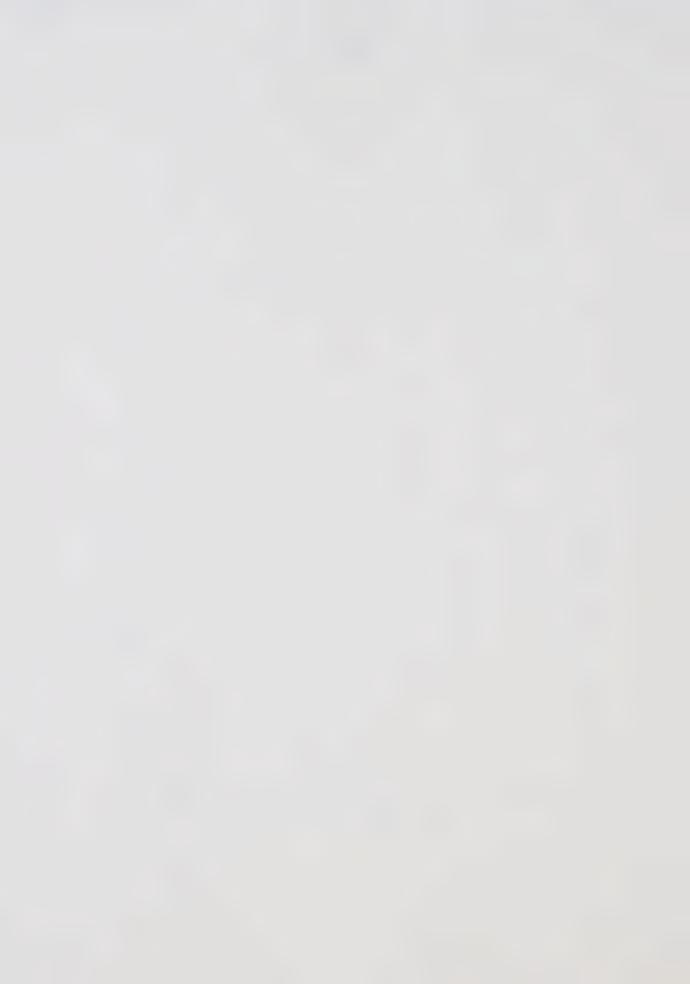
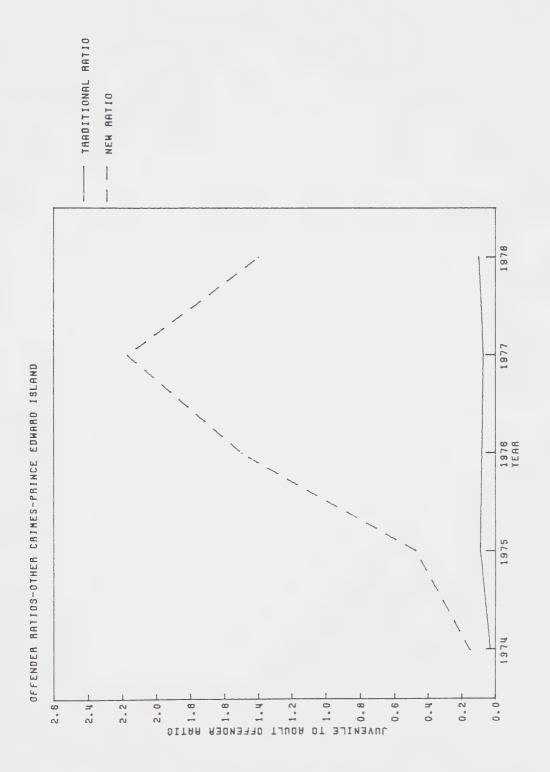


Figure 4.16



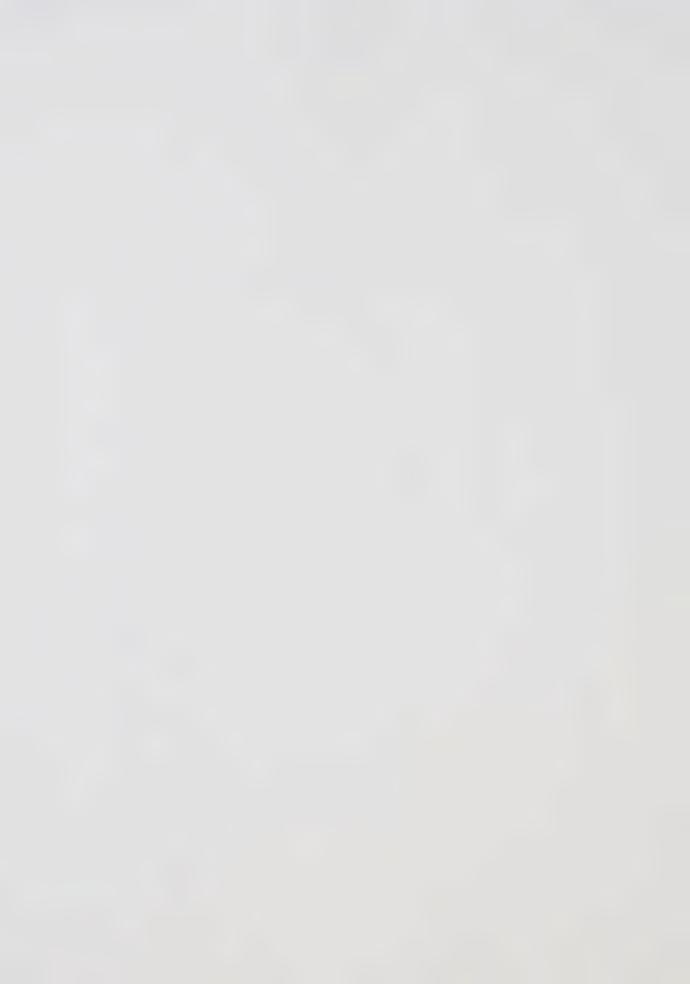
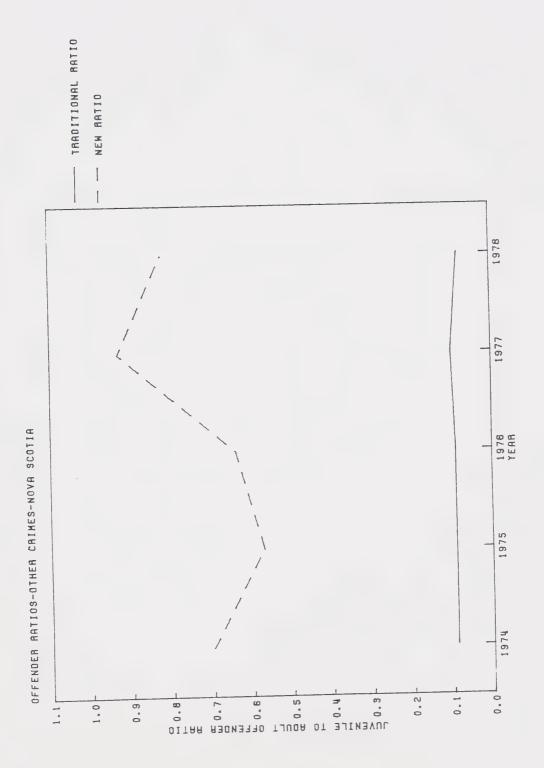


Figure 4.17



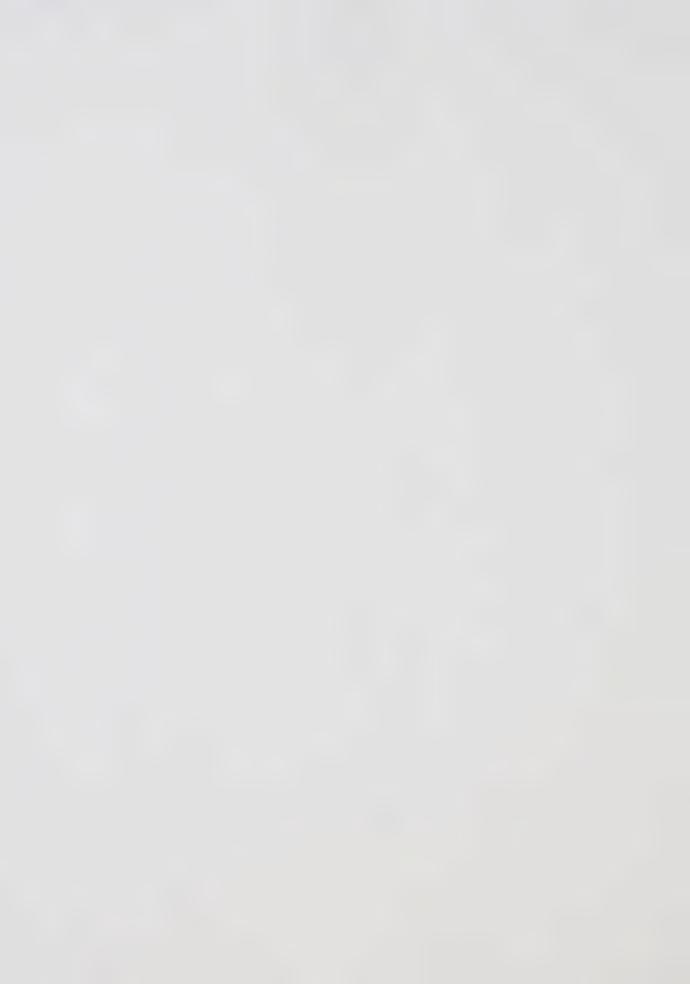
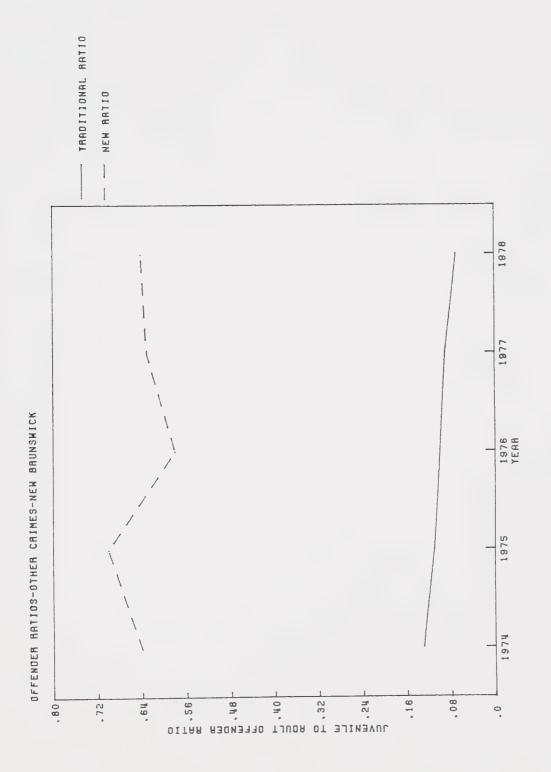


Figure 4.18



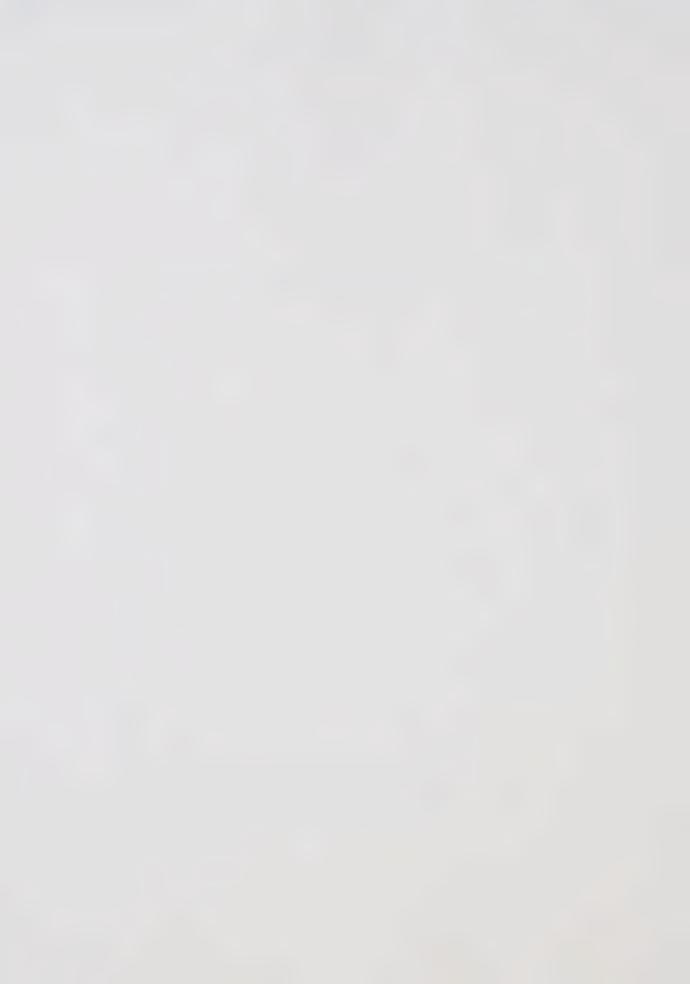
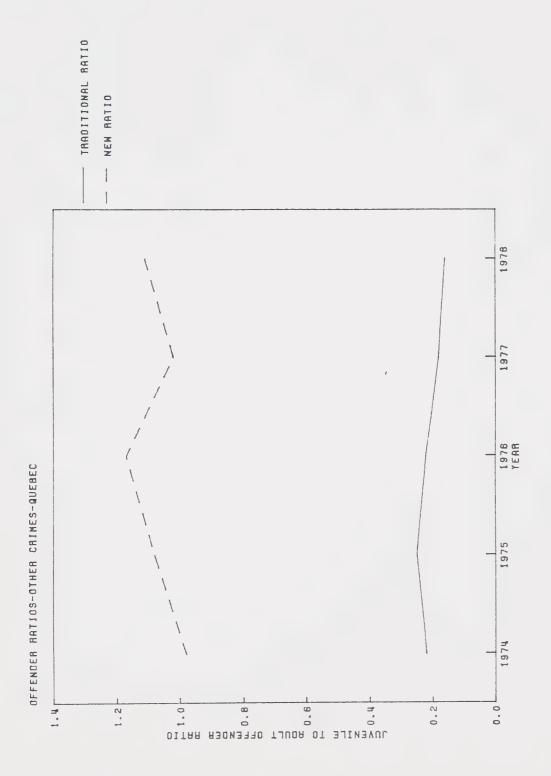


Figure 4.19



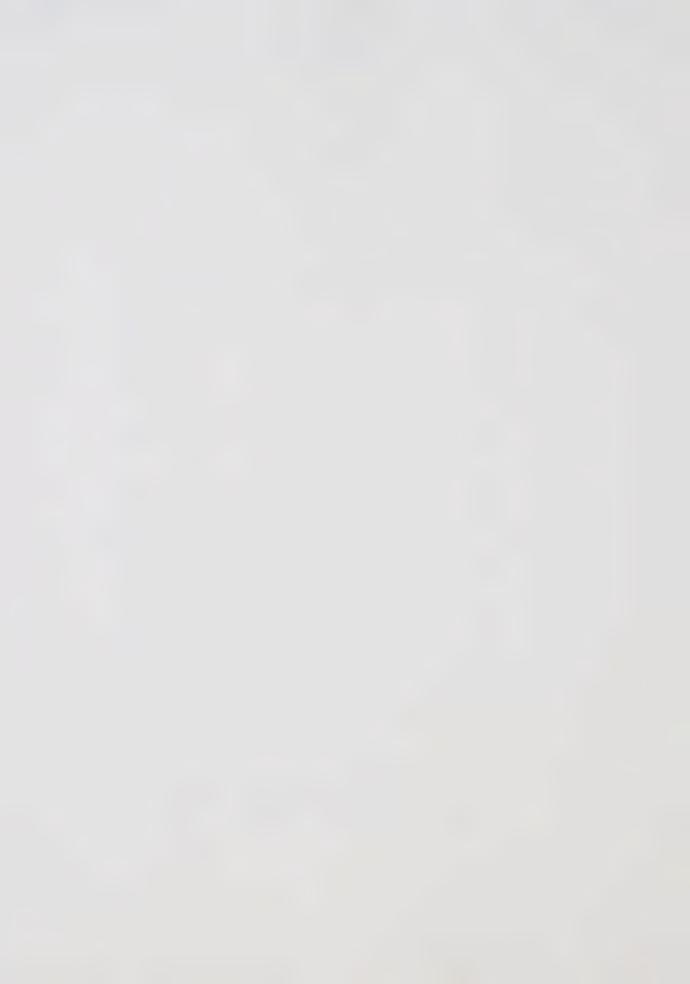
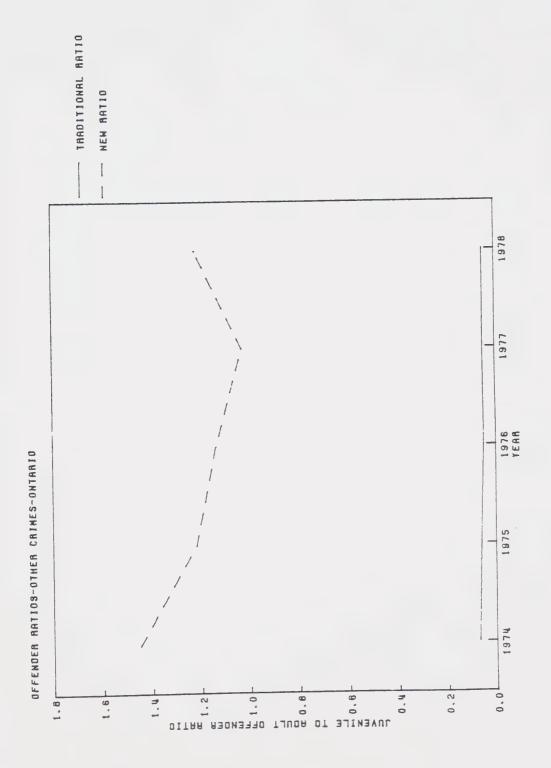


Figure 4.20



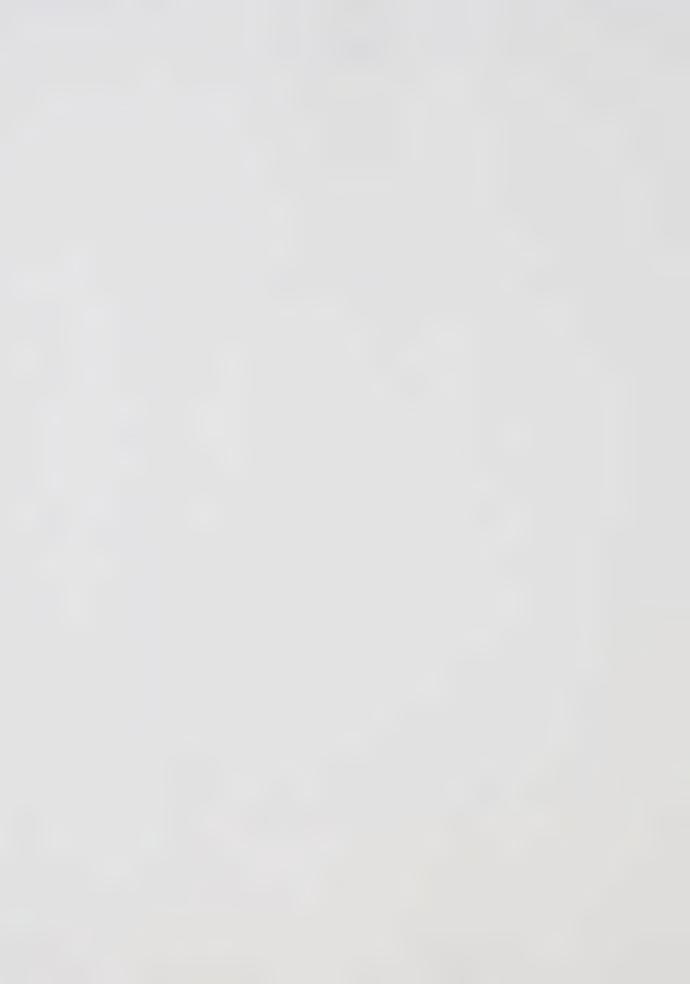
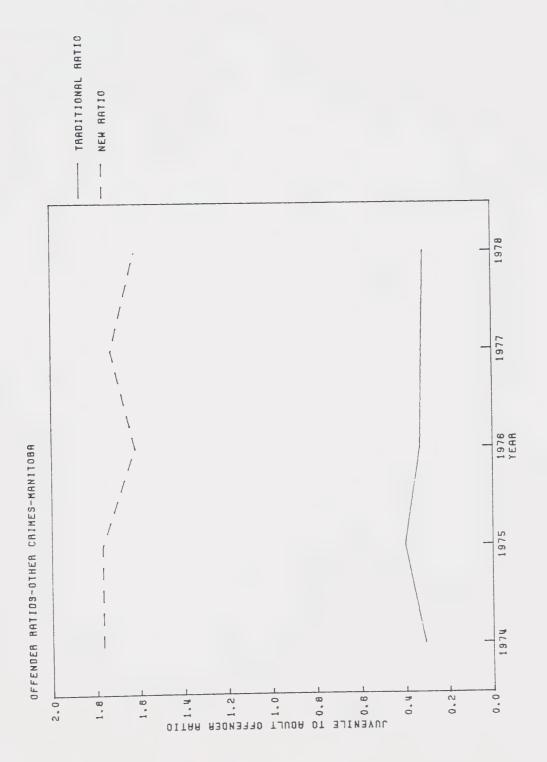


Figure 4.21



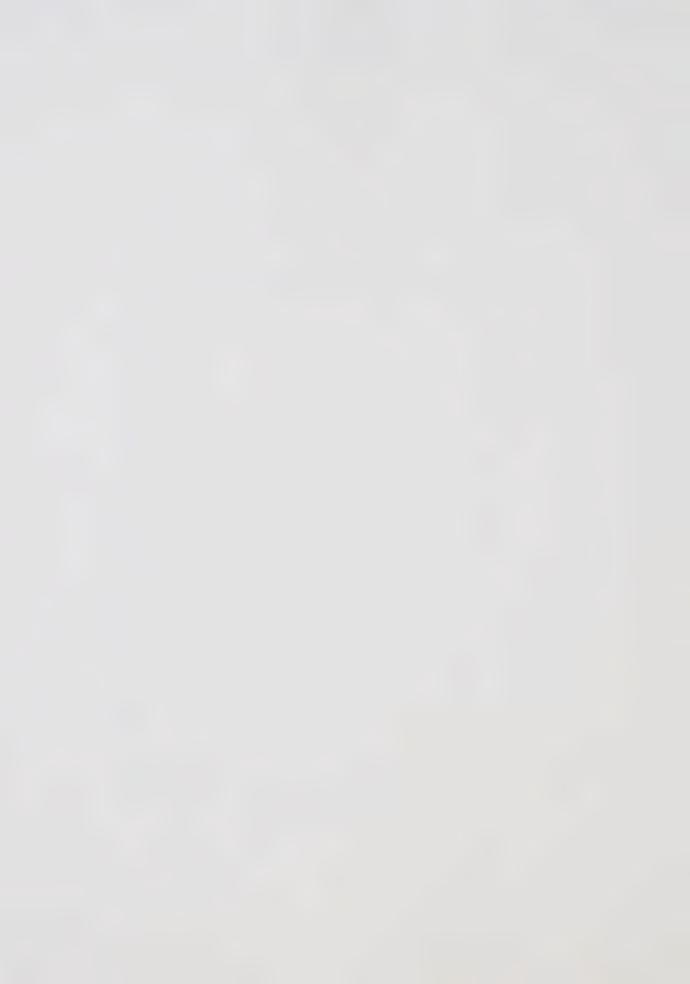
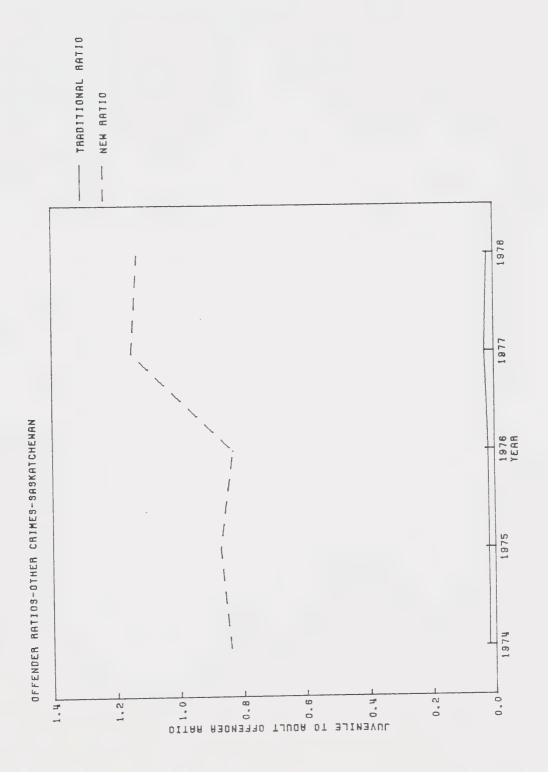


Figure 4.22



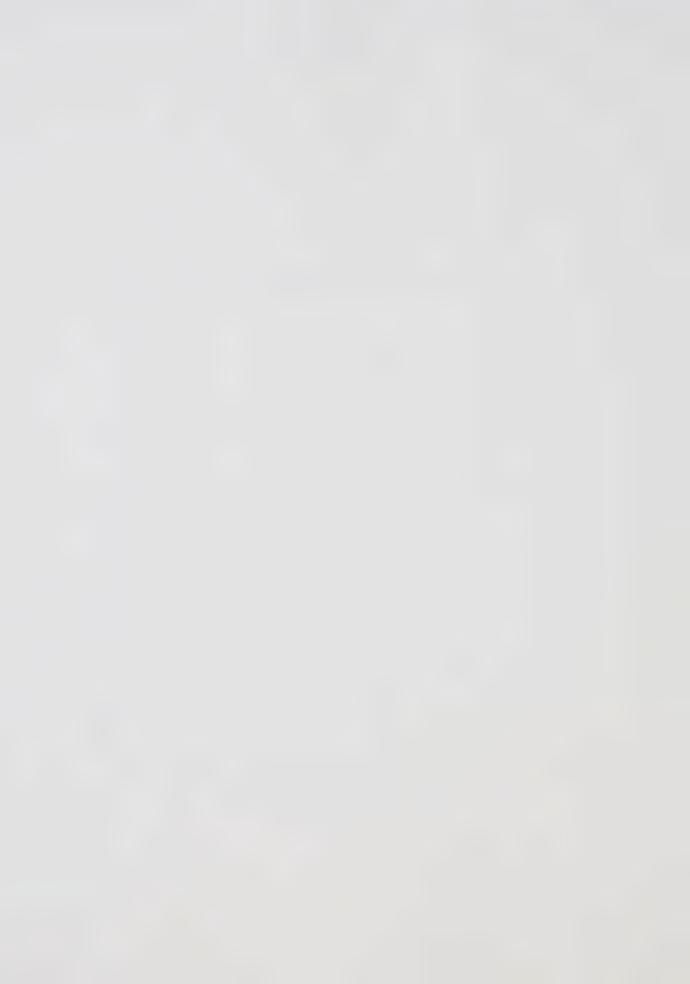
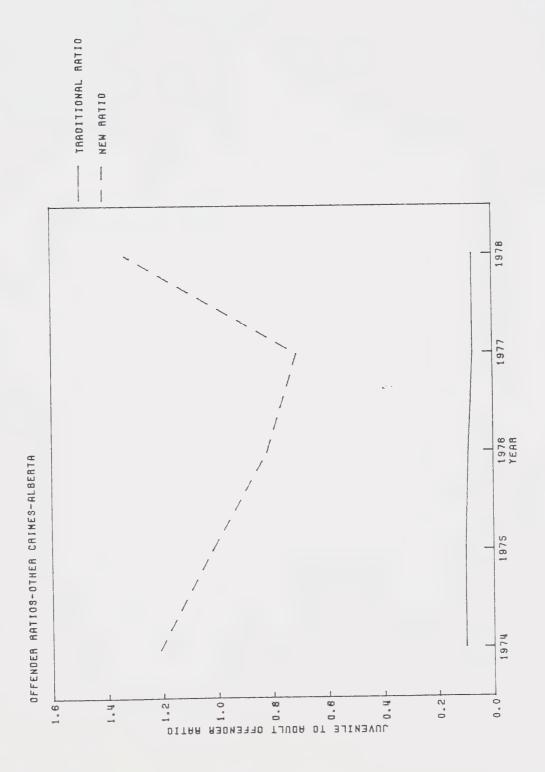


Figure 4.23



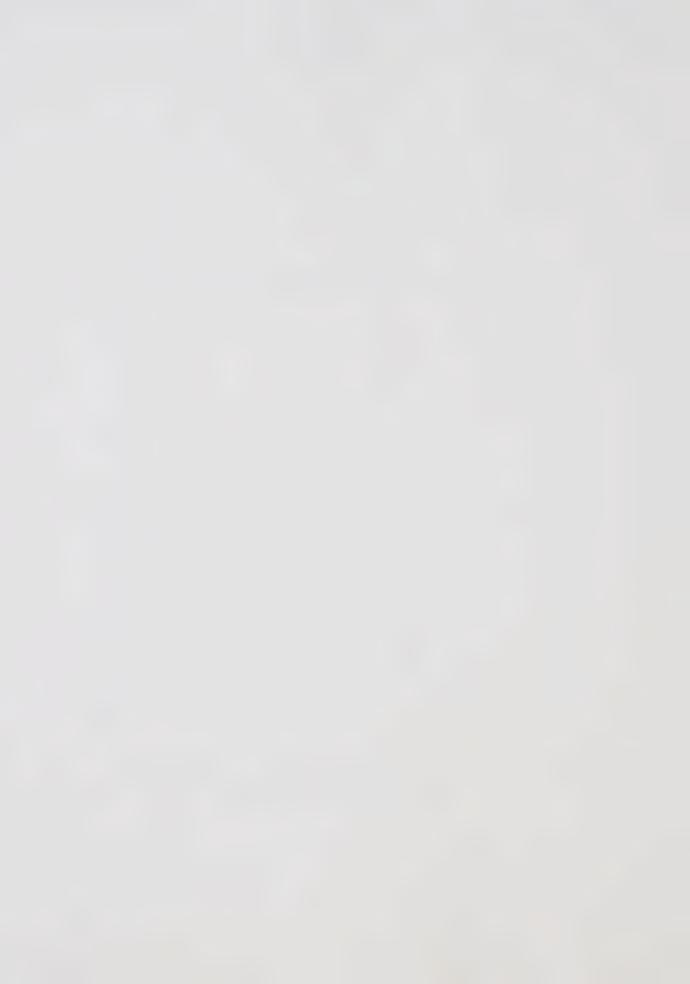
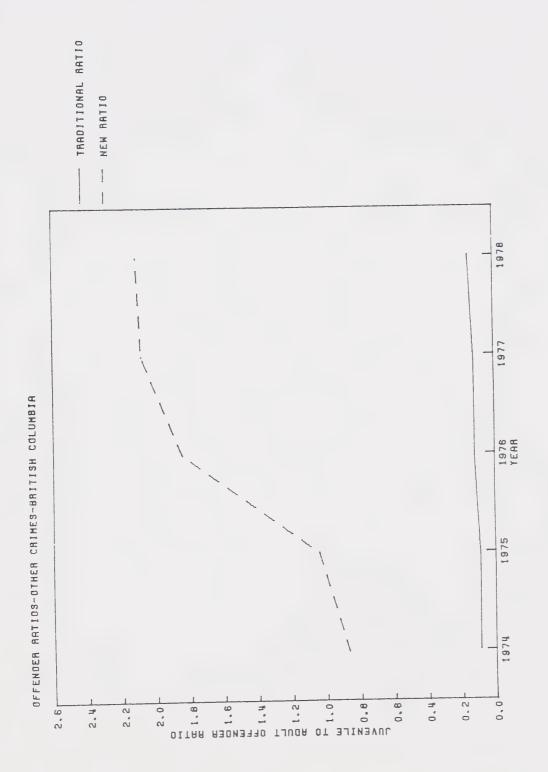


Figure 4.24



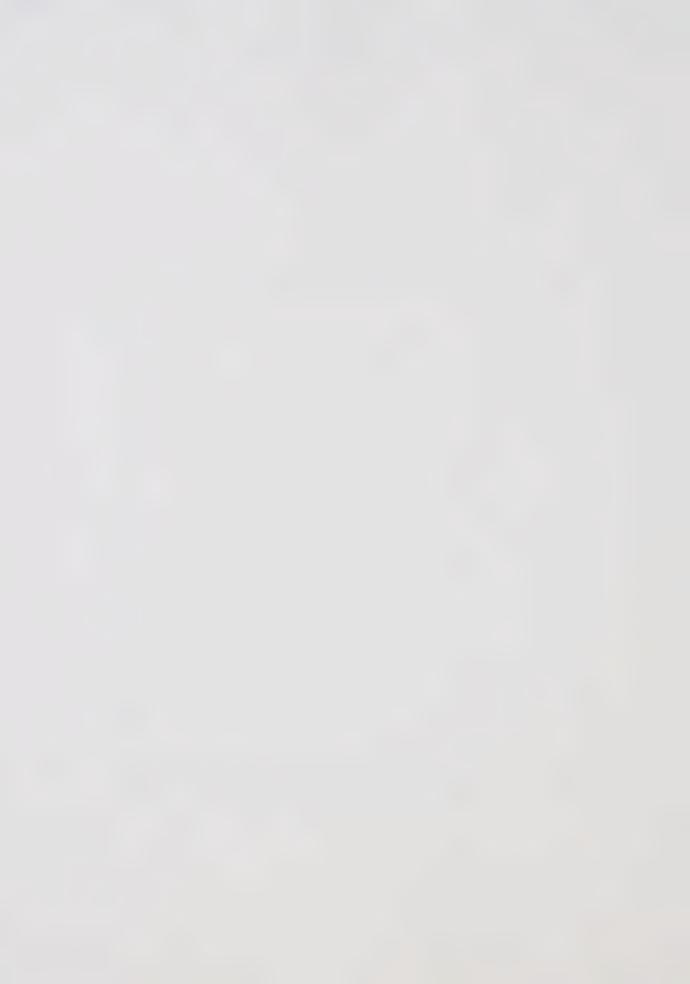
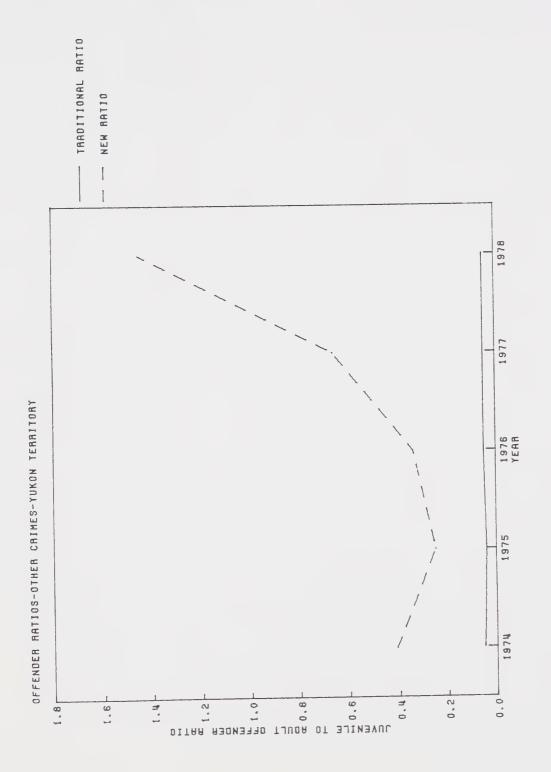


Figure 4.25



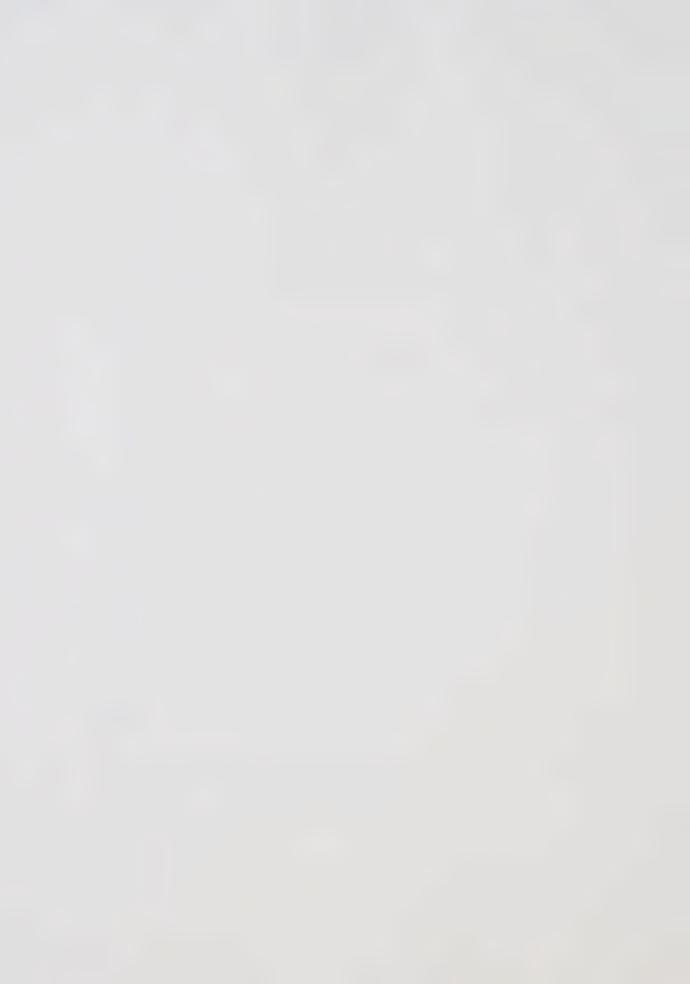
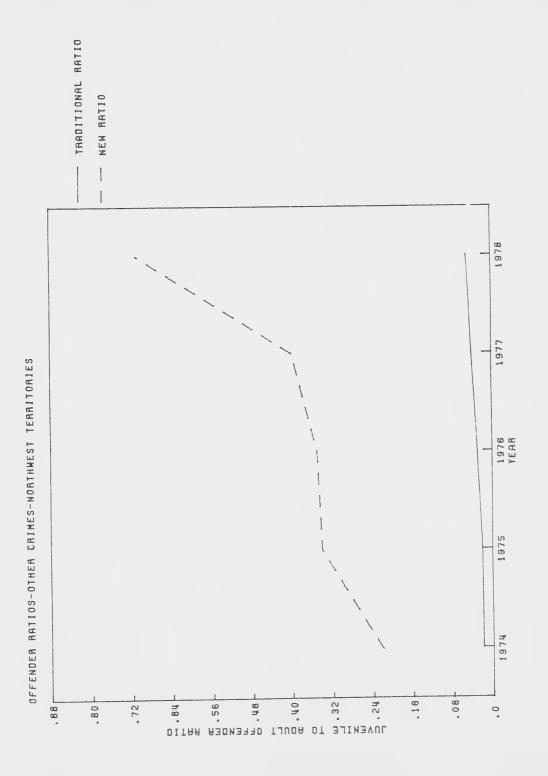
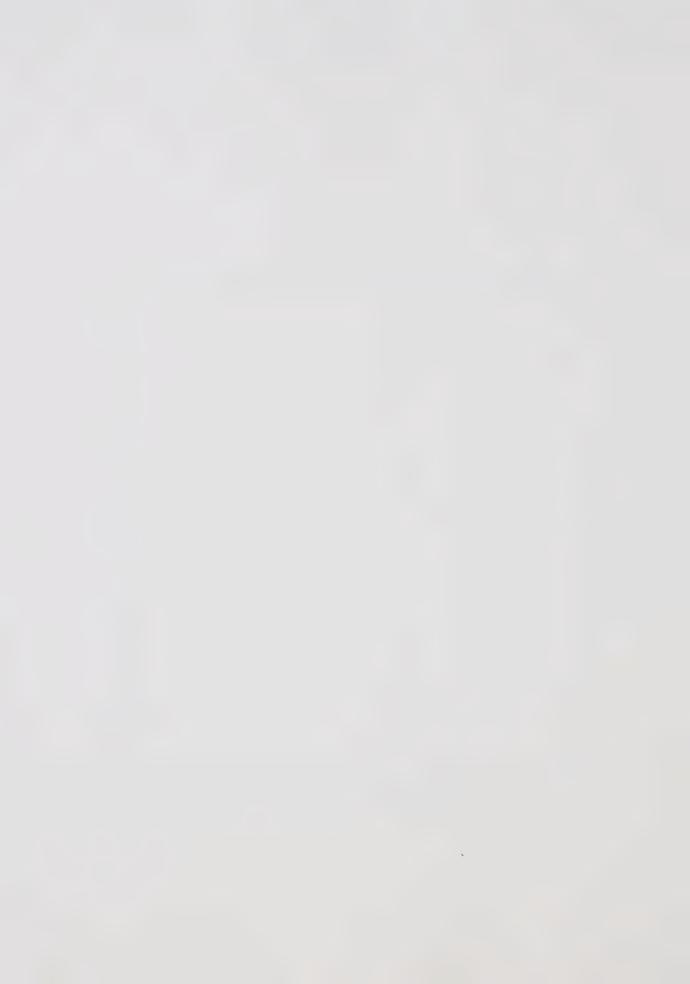


Figure 4.26



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